5/22/12

Brad Cross called

- gave him update on exemption
  - saw no issue w contaminant concentrations at plume edge
  - should wells be Class I MH?
  - garbling near well field are oriented such as to question plume flow

MM seem as having had ample opportunity to comment

Results of the NOD sent to TCEQ on the El Paso exemption

Ray Leissner to: Stacey Dwyer, Philip Dellinger, Jose Torres, David Gillespie 05/22/2012 04:22 PM

From: Ray Leissner/R6/USEPA/US

To: Stacey Dwyer/R6/USEPA/US@EPA, Philip Dellinger/R6/USEPA/US@EPA, Jose Torres/R6/USEPA/US@EPA, David Gillespie/R6/USEPA/US@EPA

Attached is the amended Table 2. In it they provide:
the 50 year worst case expected undiluted concentrate concentrations (7th column),
the concentrations of the concentrate contaminants at the wellbore in a 50/50 mix with the native formation water containing the highest concentration measured in the 3 injection wells (8th column), and
the projected concentrations of the concentrate at the plume edge in 50 years (9th column).

Updated Table 2 sent in response to NOD.pdf

My thoughts:

The 7th column gives us an indication of the injectate concentrations that have an MCL. Comparing that to the ambient water quality measured in the three injection wells, only arsenic, fluoride, gross alpha and radium exceed MCLs in the injectate.

For Arsenic

Only one of three injection wells detected arsenic barely above MCLs in the native water. While the injectate concentration is nearly 8 times the MCL, the resulting concentration at the plume edge in 50 years is almost back to background as measured in the one well it was detected. This seems to me to indicate we can expect no unacceptable degradation to the surrounding USDWs due to further migration of arsenic beyond the 50 year plume boundary.

For Fluoride

No injection well detected fluoride above MCL in the native water. The injectate is slightly higher than fluoride's MCL. However, concentrations at the edge of the 50 year plume are below MCLs. This indicates we can expect no further unacceptable degradation to the surrounding USDWs due to the continued migration of fluoride.

For Gross Alpha

All three injection wells report native water containing very high Gross Alpha (412-774 pCi/l), well over the MCL (15 pCi/l). The concentrate from the plant is 24 pCi/l. This is above MCL but well below native water concentrations. The 50 year plume edge is predicted to be well above MCL at 773 pCi/l. This indicates the minute effect of dilution one would expect at the boundary in 50 years, given the concentrations in the native waters reported in each of the 3 wells and the injectate. Because of the dilute nature of the injectate's gross alpha's concentration relative to the native waters, one could not expect degradation of native waters within the plume, at its edge, or beyond after 50 years of injection.

For Radium

Two of the three injection wells detected radium in the native waters and those detections (15 and 19 mg/l) were above MCLs (5 mg/l). There is no explanation offered for the third well not being analyzed. The concentration of the injectate (10.8 mg/l) is predicted to cause a concentration of 19 mg/l at the plume's edge in 50 years. As with gross alpha, this indicates the minute the dilution one would expect,

given the concentrations of the native waters reported in the two wells analyzed and the injectate. Because of the dilute nature of the injectate's radium concentration relative to the native waters, one could not expect degradation of native waters within the plume, at its edge, or beyond after 50 years of injection.

Summary

From the stand point of protecting the adjacent non exempted USDWs, I find no concerns. I believe the aquifer meets the criteria and I believe the modeling helped us determine an appropriate size and shape to the exemption.

Regarding shape, the issue of proximity to NM remains. Attempts to secure a written acknowledgement of the exemption from NMED's management has not been forthcoming. That said, I believe the applicant and TCEQ have provided NMED ample opportunity through formal public participation and informal communication to assert concerns. At last query, NM has expressed a desire to have a monitor well drilled at the border with TCEQ. NMED has not contacted us with concerns. The applicant has balked at the suggestion, stating expense as the reason. TCEQ concurs.

Your thoughts? Thanks.

Ray Leissner, Env. Eng.
Ground Water / UIC Section (6WQ-SG)
(214) 665 - 7183
USEPA, Region 6

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

May 11, 2012

Ms. Stacey Dwyer, P.E.
United States Environmental Protection Agency
Region 6 (6WQ)
1445 Ross Avenue
Dallas, Texas 75202-2733

Re: UIC Program Revision to Establish an Aquifer Exemption
Fusselman Formation, Montoya Group, and El Paso Group, El Paso County

Dear Ms. Dwyer:

I am writing in response to your letter of April 9, 2012 raising questions on TCEQ's request for approval of the revision of TCEQ's Underground Injection Control Program to reflect the designation of portions of the Fusselman Formation, Montoya Group and El Paso Group as an exempted aquifer in El Paso County, Texas. Your letter requests a better understanding between the data in Table 2 and Appendix C as presented in the application by El Paso Water Utilities (EPWU). This concern was forwarded to EPWU, and TCEQ received a response with a revised version of Table 2. EPWU's response is enclosed. Information from the applicant indicates that the source water used for the desalination operation, over time, will be of poorer quality and therefore the quality of the concentrate stream injected into the Fusselman will also be of poorer quality (higher concentrations). Table 2 has been updated to highlight the highest concentration for analyzed parameters from the three Fusselman Formation water samples and updated information on the 50-year projections for the concentrate waste stream, water in the well bore (assuming a mix of formation and concentrate water), and blended formation and concentrate water at the edge of the 50-year plume.

While the TCEQ appreciates EPA's effort to understand this non-substantive program revision, the TCEQ again requests that the processing of program revisions relating to aquifer exemptions follow EPA's established regulations. Under 40 CFR Section 144.7(b)(3)(ii), the approval of a state program aquifer exemption for an aquifer or portion thereof identified under Section 146.4(c) becomes final if the state director submits the exemption in writing to the Administrator and the Administrator has not disapproved the designation with 45 days. This TCEQ program revision falls under Section 144.7(b)(3)(ii), and EPA regulations do not provide for the tolling of the disapproval period as you indicated in your letter.

As indicated in the original program revision request, the designation of this aquifer exemption is crucial for the planning and conservation of drinking water supplies in the arid El Paso area. The TCEQ hopes the provided information resolves your concern and would appreciate your prompt approval of this non-substantive program revision.

If you have any questions regarding this information, or if you want to discuss it further, please contact Bryan Smith at 512-924-9439 or bryan.smith@tceq.texas.gov.

Sincerely,

Charles W. Maguire, Director
Radioactive Materials Division
Office of Waste
Texas Commission on Environmental Quality

CWM/BSS/nlc

Enclosure

cc: Don Redmond, TCEQ Law Division
Dianne Goss, TCEQ Law Division

LBG-GUYTON ASSOCIATES

PROFESSIONAL GROUNDWATER AND ENVIRONMENTAL ENGINEERING

1101 CAPITAL OF TEXAS HIGHWAY
SUITE B-220
AUSTIN, TX 78746
512-327-9640
FAX: 512-327-5573
www.lbgweb.com

April 10, 2012

Ms. Susan Jablonski, P.E.
Director
Radioactive Materials Division (MC-233)
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, Texas 78711-3087

DUE DATE _____
ARTS # 15817982
PM B. Smith

Re: El Paso Water Utilities Proposed Exempt Aquifer Water Quality Analyses

Dear Ms. Jablonski:

In response to EPA's April 9, 2012 correspondence to TCEQ regarding clarification between Table 2 and Appendix C in El Paso Water Utilities "Aquifer Exemption Request for Class V Injection Wells," we are providing a modified Table 2 which provides clarification of 50-year projections of concentrate from the plant, well bore concentration, and concentration at the edge of the plume (0.001 concentration line from model results). The concentrate from the plant (50-year projection) reflects assumed increases in current concentrations (Appendix C) due to degrading source water quality.

We greatly appreciate the cooperation of TCEQ in working with EPWU throughout the aquifer exemption process and respectfully request that TCEQ forward this information to EPA Region VI at your earliest convenience. Should you have any questions, please do not hesitate to contact me at (512) 327-9640.

Sincerely,

LBG-GUYTON ASSOCIATES

Brad L. Cross
Associate

cc: Scott Reinert, EPWU
Ben Knape, TCEQ

Enclosure

Table 2

Proposed Exempt Aquifer Water Quality Analyses

All concentrations in milligrams per liter (mg/L) except where noted (Gross Alpha, Ra-226 + Ra-228, and uranium)

Parameter	Primary Standard	Injection Well				50-Year Projections		
		JDF-1	JDF-2	JDF-3	Highest Concentration of the Three Wells (Assumed Formation Water Quality)	Concentrate from Plant	Well Bore Concentration (Assumes 50/50 Mix of Formation Water and Concentrate)	Concentration at Edge of Plume (0.001 concentration line from model results)
Antimony	0.006	N/A	< 0.01	< 0.01	<0.01	BDL	BDL	BDL
Arsenic	0.01	0.0106	< 0.01	< 0.01	0.0106	0.079	0.0395	0.0107
Barium	2	N/A	0.055	0.056	0.056	0.466	0.261	0.056
Beryllium	0.004	N/A	< 0.004	< 0.004	<0.004	BDL	BDL	BDL
Cadmium	0.005	N/A	< 0.003	< 0.003	<0.003	BDL	BDL	BDL
Chromium	0.1	N/A	< 0.010	< 0.010	<0.010	BDL	BDL	BDL
Cyanide	0.2	N/A	< 0.02	< 0.02	<0.02	BDL	BDL	BDL
Fluoride	4	3.11	1.09	1.12	3.11	5.6	4.36	3.11
Gross Alpha (less Ra and U) (pCi/L)	15	412 ± 56.721	620 ± 170	774 ± 40	774 ± 40	24	399	773
Mercury	0.002	N/A	< 0.0005	< 0.0005	<0.0005	BDL	BDL	BDL
Nitrate	10	< 0.5	< 0.10	< 0.10	<0.10	BDL	BDL	BDL
Nitrite	1	1.14	< 0.05	< 0.05	1.14	BDL	0.57	1.14
Ra-226 + Ra-228 (pCi/L)	5	N/A	15 ± 1	19 ± 2	19 ± 2	10.8	14.9	19.0
Selenium	0.05	N/A	< 0.010	< 0.010	< 0.010	BDL	BDL	BDL
Thallium	0.002	N/A	< 0.010	< 0.010	< 0.010	BDL	BDL	BDL
Uranium (ug/l)	30	N/A	21	8.6	21	22	21.5	21.0

Notes:

Concentrate from Plant (50-Year Projection) reflects assumed increases in conentrate concentrations (from Appendix C) due to degrading source water quality

BDL = Below Detection Limit

Equals or Exceeds Primary Drinking Water Standard

50-year water quality projections

1. Trend of water quality degradation was established using the TDS of the source water entering the plant during the years 2008-2011.
2. The starting, ending, and average TDS for the years 2008-2011 was 2610, 3235, and 2922 mg/l, respectively.
3. From the linear regression, assume a degradation factor of 2 for the 50-year period.

50 year projections of water quality parameters in the concentrate.

1. The water quality of the undiluted concentrate is found in Appendix C (from June 2009). Using a degradation factor of 2, we can estimate the chemical composition of the concentrate in 50 years.

Parameter	Undiluted concentrate (Appendix C) June 2009	50-year projection
Arsenic	39 ppb	79 ppb
Barium	0.233 mg/l	0.466 mg/l
Antimony	BDL	BDL
Beryllium	BDL	BDL
Cadmium	BDL	BDL
Chromium	BDL	BDL
Cyanide	BDL	BDL
Flouride	2.81 mg/l	5.6 mg/l
Gross Alpha Less Ra and U	12 +7 pCi/l	24 pCi/l
Mercury	BDL	BDL
Nitrate	BDL	BDL
Nitrite	BDL	BDL
Ra-226+Ra-228	5.4 pCi/l	10.8 pCi/l
Selenium	BDL	BDL
Thallium	BDL	BDL
Uranium	11ug/l	22 ug/l

NOD on the El Paso Exemption Request

Ray Leissner to: Susan Jablonski 04/09/2012 02:23 PM
Cc: Ben Knape, Stacey Dwyer, Philip Dellinger, David Gillespie, bcross

From: Ray Leissner/R6/USEPA/US
To: Susan Jablonski <Susan.Jablonski@tceq.texas.gov>
Cc: Ben Knape <Ben.Knape@tceq.texas.gov>, Stacey Dwyer/R6/USEPA/US@EPA, Philip Dellinger/R6/USEPA/US@EPA, David Gillespie/R6/USEPA/US@EPA, bcross@lbg-guyton.com

Ms. Jablonski,

This email is in regard to TCEQ's request, received on February 27, 2012, to exempt portions of aquifers, under criterion 40 CFR 146.4 (c) for disposal of undiluted desalination wastes from the Kay Bailey Hutchinson Plant near El Paso. We are still reviewing the exemption request. We have at least one issue at this time that requires additional information. The formal request for additional information has been mailed today. However, so that we may ensure that TCEQ is notified prior to the 45 days allowed for automatic approval of such exemptions under 40 CFR 144.7 (b) (3), I have attached the signed request for additional information in pdf format. I have also informally discussed this matter with Mr. Brad Cross of LBG-Guyton, contractor for El Paso Water Utilities. Please call me if you or your staff wish to discuss. Thank you.

NOD to El Paso Exemption FINAL 04-09-12.pdf

Ray Leissner, Env. Eng.
Ground Water / UIC Section (6WQ-SG)
(214) 665 - 7183
USEPA, Region 6

The FIRST STEP in protecting your ground water is to have your well tested.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

APR 9 2012

Susan Jablonski, P. E., Director
Radioactive Materials Division
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, Texas 78711-3087

Re: Application for Exemption of Portions of the Fusselman Formation, Montoya Group and El Paso Group in El Paso County, Texas

Dear Ms. Jablonski:

This letter is in response to the referenced application received by EPA on February 27, 2012. A review of the application is ongoing. However, in the transmittal letter to that application TCEQ requested exemption under the criterion at 40 CFR 146.4 (c), which allows for a 45 day automatic approval process. Although the review is not yet complete, we have questions at this time. Therefore we are submitting this letter to inform you of our concerns and recognize that this request for information concludes the automatic approval process.

Our concerns require a better understanding between the data in Table 2 and Appendix C. Table 2 reflects the native water quality analysis for each existing injection well and the projected water quality analysis in the receiving aquifers at the well sites after 50 years of injection. Appendix C reflects the analysis of the current non-diluted concentrate to be injected upon exemption of the aquifers. A comparison of the same parameters in Table 2 and Appendix C indicates some parameter's concentrations will exceed the existing water quality concentrations and the non-diluted concentrate's concentrations after 50 years of injection. We ask for a resolution to this apparent discrepancy.

Should you or your staff have any questions or wish to discuss this matter, please contact Mr. Philip Dellinger, Chief of the Ground Water/UIC Section, at (214) 665-8324. Thank you.

Sincerely yours,

Stacey B. Dwyer

Stacey B. Dwyer, P.E.
Associate Director
Source Water Protection Branch

cc: Ben Knape, TCEQ

Review of TCEQ El Paso Exemptions

3-14-12

issues to resolve

- if the app does not contain a written acknowledgement by the State of NM. Do we want one?

- What will be the acceptable thresholds for contaminant concentrations? We don't want NM concentrations exceeded.

EPA generally exempts aquifers for a specific well class. If we exempt this for Class II disposal, it does not make sense. Class II by definition is allowed to inject into a USDW. I suppose this will be the first Class II exemption in the nation. I see no difference in this injection and Class I NH. Class I NH injects below all USDWs. These wells will too if the exemption is granted. Class I NH can exceed Texas' concentration standards. These well will too. That's the purpose of the exemption. Texas requires Class II's not "pollute" fresh water, Texas Water Code Chapter 27 & TCEQ rules at 30 TAC Chapter 331.

El Paso Exemption request status

Ray Leissner to: bcross
Cc: Stacey Dwyer, Philip Dellinger, David Gillespie

04/03/2012 03:42 PM

From: Ray Leissner/R6/USEPA/US
To: bcross@lbg-guyton.com
Cc: Stacey Dwyer/R6/USEPA/US@EPA, Philip Dellinger/R6/USEPA/US@EPA, David Gillespie/R6/USEPA/US@EPA

Brad,

I'm still plugging away at the exemption. I spoke with Ben Knape this morning. He was interested in our position on the 45 day matter. He clarified TCEQ's cover letter to the exemption. He offered that although TCEQ approved the exemption under 146.4 (a) and (b) (2), they were suggesting in the cover letter that, since EPA must consider the exemption under its own criteria, it could consider the exemption under 146.4 (c) as well. If so, this would allow for the implication of the 45 day clause. We are looking into that potentiality.

Assuming we could, by my watch EPA got the package on February 27th. Add 45 days to that and the 45 days would run out COB April 12th. I'd like to achieve the decision in that time frame and at the moment I don't see any potential red flags with the exceptions we discussed on March 22. I suspect our Division Director is going to want some form of acknowledgement from NM. In addition, we really are interested in the expected contaminant concentrations in the injectate, once the exemption goes into effect. That's a key factor in the attenuation modeled in the application. How is that coming along?

Also beware that technically I suspect the requests thus far have been at an informal level. If need be, we may need to send a formal NOD, and perhaps a clarification, to the State. I'd like to avoid that as if possible, as that would stop the clock. This assumes we find the clock applicable. Thanks

Ray Leissner, Env. Eng.
Ground Water / UIC Section (6WQ-SG)
(214) 665 - 7183
USEPA, Region 6

Ray's copy

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

AN ORDER concerning the application of El Paso Water Utilities for Aquifer Exemption Number 5X2700062; TCEQ Docket No. 2011-1814-UIC.

On December 7, 2011, the Texas Commission on Environmental Quality (Commission) during its public meeting evaluated the request for hearing submitted concerning the application of El Paso Water Utilities for Aquifer Exemption Number 5X2700062. The request for hearing was evaluated under the requirements in the applicable statutes and Commission rules, including 30 TAC Chapter 55, Subchapter G. The Commission also considered all timely filings in this matter including the responses to the hearing request filed by the Executive Director, the Applicant, and the Office of Public Interest Counsel.

one person denied hearing

After considering these filings and answers to its questions during its public meeting, the Commission determined that the requestor, Juan M. Navar, Sr., on behalf of Wonders of Ancient Culture and Modern West, LLC, was not an affected person under the applicable statutes and regulations. Therefore, the Commission determined to deny the hearing request and issue Aquifer Exemption Number 5X2700062.

should've inquired as to how he was disqualified?

NOW, THEREFORE, BE IT ORDERED BY THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY that:

(1) The hearing request of Juan M. Navar, Sr., on behalf of Wonders of Ancient Culture and Modern West, LLC is DENIED;

(2) Aquifer Exemption Number 5X2700062 is hereby APPROVED and ISSUED in the form as shown in the draft aquifer exemption order prepared by the Executive Director; and

(3) The Executive Director's Response to Comments is ADOPTED.

Issue date: DEC 15 2011

TEXAS COMMISSION ON
ENVIRONMENTAL QUALITY

Bryan W. Shaw

Bryan W. Shaw, Ph.D., Chairman

Rays Copy

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

February 16, 2012

91 7108 2133 3935 2172 3125
CERTIFIED MAIL

Mr. William Honker
Acting Director
Water Quality Protection Division
United States Environmental Protection Agency
Region 6 (6WQ)
1445 Ross Avenue
Dallas, Texas 75202-2733

6WQ-Copy ... 6WQ-D.....
6WQ-A..... 6WQ-C.....
6WQ-E..... 6WQ-P.....
6WQ-S Original w/enc. .....
.....

Re: UIC Program Revision to Establish an Aquifer Exemption
Fussleman Formation, Montoya Group, and El Paso Group, El Paso County

Dear Mr. Honker:

On December 15, 2011, the Texas Commission on Environmental Quality (TCEQ) issued an order designating a portion of the Fusselman Formation, Montoya Group, and El Paso Group (hereinafter referred to as the Fusselman, Montoya, and El Paso group) as an exempt aquifer under TCEQ rule 30 Tex. Admin. Code §331.13. The designation of the exempt aquifer was made at the request of El Paso Water Utilities (EPWU) in conjunction with the operation of the Kay Bailey Hutchinson Desalination Plant and EPWU's use of Class V injection wells in El Paso County, Texas. EPWU states that the desalination plant is a vital part of the El Paso region's drought-prone water supply and that the aquifer exemption will allow the conservation of drinking water resources. Copies of the application and aquifer exemption order are attached.

The TCEQ's consideration of the designation of this exempt aquifer was subject to mailed and newspaper published notice, a public meeting held in El Paso County, and a public comment period. A formal response was issued addressing the comments submitted during the comment period. The TCEQ's approval of the designation of the exempt aquifer is consistent with the state's authorized underground injection control program rule in 30 Tex. Admin. Code §331.13, the Environmental Protection Agency's (EPA's) criteria for exempted aquifers in 40 CFR §146.4, and EPA's *Guidance for Review and Approval of State Underground Injection Control (UIC) Programs and Revisions to Approved State Programs*, GWPB Guidance #34.

In accordance with 40 CFR §§ 144.7, 145.32, and 146.4, the TCEQ requests EPA's approval of the revision of TCEQ's Underground Injection Control Program to reflect the designation of this exempted aquifer. The 115 square mile aquifer exemption area is described in TCEQ's aquifer exemption order and discussed in the enclosed application. The part of the aquifer to be exempted includes the Fusselman, Montoya, and El Paso group. The total dissolved solids (TDS) concentration of water sampled from the Fusselman, Montoya, and El Paso group in the exempted aquifer is greater than 8,000 milligrams per liter (mg/l). The exempted portion of

these formations is not currently used as a source of drinking water. The exempted portion of these formations will not in the future serve a source for drinking water because it is situated at a depth and location which makes recovery of water for drinking water purposes economically or technologically impractical. Because the total dissolved solids content of the ground water is more than 3,000 and less than 10,000 mg/l and the ground water is not reasonably expected to supply a public water system, the designation of the exempt aquifer becomes final if the Administrator does not disapprove the designation within 45 days of the receipt of this request under 40 CFR § 144.7(b)(3)(ii).

In accordance with Section II (relating to Program Revisions) of EPA's *Guidance for Review and Approval of State Underground Injection Control (UIC) Programs and Revisions to Approved State Programs*, GWPB Guidance #34, this program revision is not considered a substantial program revision. The exempted aquifer contains water of greater than 3,000 mg/l TDS; the exempted aquifer is not related to a Class I injection well; and the exempted aquifer is related to a specific injection well authorization. To assist in the review of the aquifer exemption, I am enclosing the following information organized according to Guidance 34 criteria, including: the TCEQ order and map of the exempted area, a written description of the exempted aquifer, the demonstration that the exempted aquifer does not currently serve as a source of drinking water, and the demonstration that the exempted aquifer will not in the future serve as a source of drinking water because it is situated at a depth or location which makes recovery of water for drinking water purposes economically or technologically impractical.

The TCEQ would appreciate EPA's prompt approval of this non-substantial program revision in accordance with 40 CFR §§ 144.7, 145.31 and 145.32. Because EPWU is relying on the designation of the exempt aquifer for preservation of drinking water supplies in the El Paso area, the TCEQ may allow EPWU to operate injection wells with the exempt aquifer status if the designation is not disapproved by the Administrator within 45 days of the receipt of this request.

Should you have any questions or need additional information, please contact Mr. Bryan Smith at (512) 239-6075 or send correspondence to him at mail code MC233.

Sincerely,

Susan Jablonski, P.E., Director
Radioactive Materials Division
Texas Commission on Environmental Quality
SJ/BS/nlc

cc: Mr. Jose Torres, EPA Region 6, 6WQ-S

Enclosure (4)

Raya copy

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

TCEQ DOCKET NO. 2011-1814-UIC

APPLICATION BY EL PASO WATER UTILITIES FOR AN AQUIFER EXEMPTION	§ § §	**BEFORE THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY**

AQUIFER EXEMPTION ORDER

The Texas Commission on Environmental Quality (TCEQ) finds that:

1. On August 21, 2008, El Paso Water Utilities (EPWU) submitted an application to request designation of an exempted aquifer under 30 TAC Section 331.13.

2. The aquifer requested to be exempted consists of a portion of the Fusselman Formation, Montoya Group, and El Paso Group (hereinafter referred to as the Fusselman, Montoya, and El Paso group) with a combined thickness of approximately 2,480 feet and a top ranging from approximately 1,000 to 4,000 feet below ground as depicted in Figure 18 of the application providing a structure map on the top of the Fusselman. The area of the proposed exempt aquifer is a rectangle of approximately 115 square miles, extending approximately 19.2 miles from north to south and 5.98 miles from east to west and is located in El Paso County. The northwest corner of the proposed exempt aquifer is located at latitude 32° 00' 13.38" N, longitude 106° 11' 49.28" W; the southwest corner is located at latitude 31° 43' 30.00" N, longitude 106° 11' 49.28" W; the southeast corner at latitude 31° 43' 30.00" N, longitude 106° 05' 42.12" W; and the northeast corner at latitude 32° 00' 12.74" N, longitude 106° 05' 42.12" W. Maps depicting the exempted aquifer area are attached.

specific coordinates? good

3. The groundwater in the portion of the Fusselman, Montoya, and El Paso group described in Finding #2 contains a concentration of up to 8,800 mg/l total dissolved solids (TDS). Because the groundwater TDS concentration is less than 10,000 mg/l, according to 30 TEX. ADMIN. CODE §§ 331.2 and 331.13, this portion of the Fusselman, Montoya, and El Paso group is considered an underground source of drinking water unless it is designated an exempted aquifer.

4. EPWU currently operates a groundwater desalination plant for public water supply, with injection wells for safe management and disposal of the resulting desalination concentrate wastewater. EPWU requests the designation of the exempted aquifer in conjunction with the use of injection wells authorized under TCEQ Authorization No. 5X2700062 for injection of desalination concentrate that does not meet all primary and secondary drinking water standards.

purpose

5. The Class V injection wells associated with the proposed aquifer exemption were authorized by TCEQ on July 13, 2005 and are located on Fort Bliss Military Reservation approximately twelve miles north of State Highway 180 and 22 miles northeast of the Kay Bailey Hutchinson Desalination Plant in El Paso County, Texas. The Class V injection wells are located as follows: the well designated as JDF-1 at latitude 31° 59' 49" N, longitude 106° 06' 25" W; the well designated as JDF-2 at latitude 31° 58' 24" N, longitude 106° 06' 30" W; the

well designated as JDF-3 at latitude 31° 59' 15" N, longitude 106° 06' 43" W; the well designated as JDF-4 at latitude 31° 59' 55" N, longitude 106° 07' 45" W; and the well designated as JDF-5 at latitude 31° 59' 13" N, longitude 106° 06' 05" W.

6. An exempted aquifer is an aquifer or a portion of an aquifer which meets the criteria for fresh water but has been designated an exempted aquifer by the commission after notice and opportunity for hearing.

7. An aquifer or portion of an aquifer may be designated as an exempted aquifer if the following criteria are met:

   (1) It does not currently serve as a source of drinking water for human consumption; and

   (2) Until exempt status is removed according to 30 TAC §331.13(f), it will not in the future serve as a source for human consumption because:

      (A) It is mineral, hydrocarbon or geothermal energy bearing with production capability;

      (B) It is situated at a depth or location which makes recovery of water for drinking water purposes economically or technically impractical;

      (C) It is so contaminated that it would be economically or technologically impractical to render that water fit for human consumption; or,

      (D) It is located above a Class III well mining area subject to subsidence or catastrophic collapse.

that's right. TCEQ does not have the equivalent to 146.4(c) the 45 days clause

8. EPWU has demonstrated that the portion of the Fusselman, Montoya, and El Paso group described in Finding #2 is not currently, nor has ever been, a source of drinking water for human consumption by conducting a data search and a ground investigation that showed that there are no water wells that withdraw water used for human consumption within the exempted aquifer.

9. EPWU has demonstrated that the portion of the Fusselman, Montoya, and El Paso group described in Finding #2 is situated at a depth (1,000 to 4,000 feet at top) which makes recovery of water for drinking water purposes economically or technically impractical.

@ 1000' water wells is NOT impractical

10. The TCEQ also notes that water samples taken from the Fusselman, Montoya, and El Paso group exhibit a high concentration of certain radionuclides (gross alpha and radium 226 & 228).

removal of contaminants by anyone except EWPU is economically & technically impractical

public notice

11. Notice of the aquifer exemption was issued June 7, 2011, published in the *El Paso Times* on June 21, 28 and July 5, 2011 and *El Diario* on June 21, 28, and July 5, 2011, and mailed to the same recipients required for notice of an injection well permit application.

12. The notice described the process for submitting comments and requesting a hearing on the aquifer exemption.

13. A public meeting was held on Thursday, July 14, 2011, 7:00 p.m., at Tech H2O Center, 10751 Montana Ave., El Paso, Texas 79935.

public meetings

14. The Executive Director of the Texas Commission on Environmental Quality provided a response to all timely, relevant and material, or significant public comments on the application.

Now, therefore, be it ordered by the Texas Commission on Environmental Quality that:

1. The portion of the Fusselman, Montoya, and El Paso group described in Finding #2 be designated as an exempted aquifer under 30 TAC § 331.13(c);

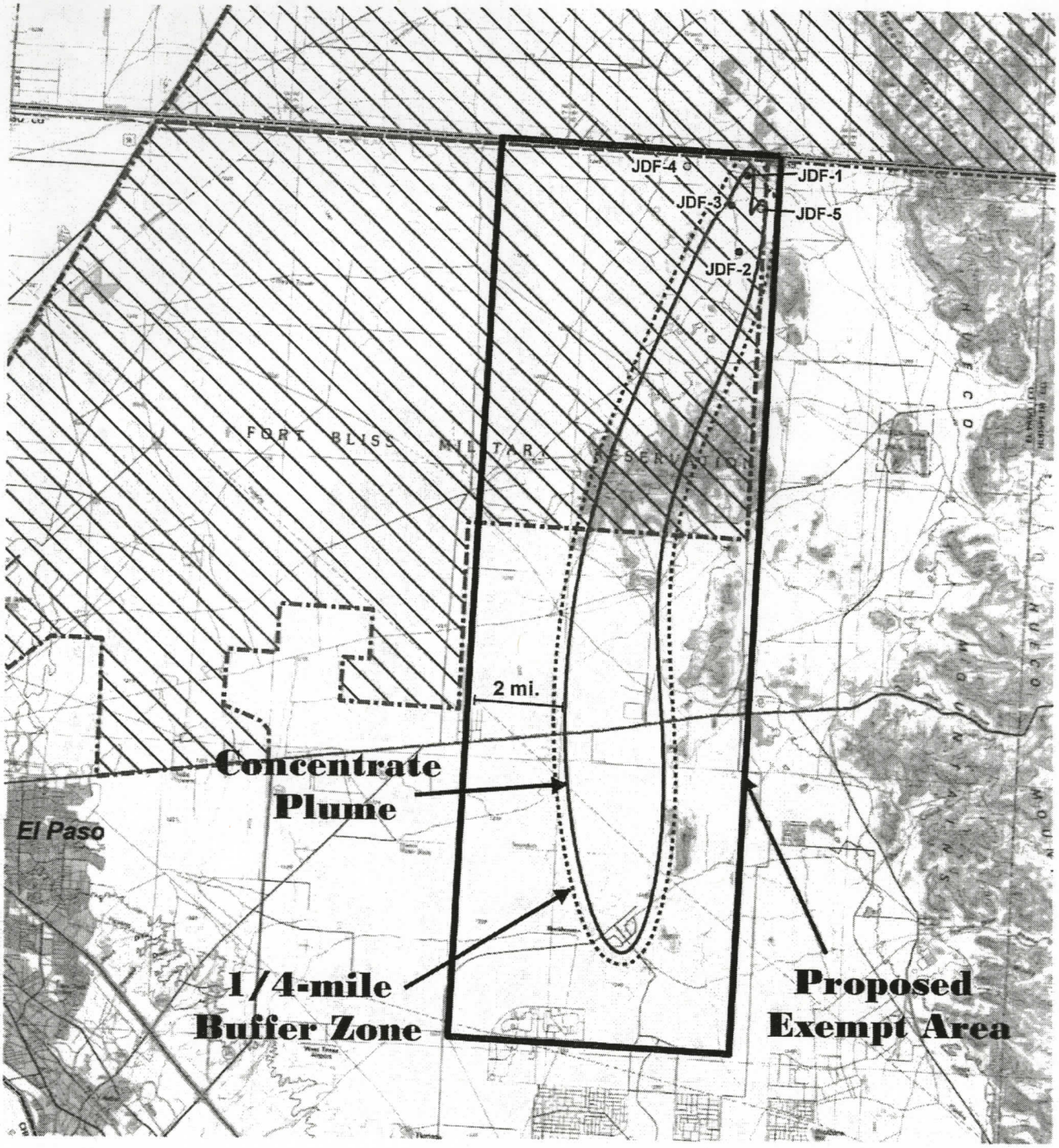
2. The Executive Director of the Texas Commission on Environmental Quality submit a program revision to the United States Environmental Protection Agency (EPA) under 40 CFR §§ 144.7, 146.4, and 145.32 to reflect this aquifer exemption designation for the Underground Injection Control program for the State of Texas; and

3. No designation of an exempted aquifer shall be final until approved by the EPA as part of the delegated Underground Injection Control Program.

Issue Date: DEC 15 2011

Texas Commission on
Environmental Quality

Bryan W. Shaw, Ph.D.
Chairman



Explanation

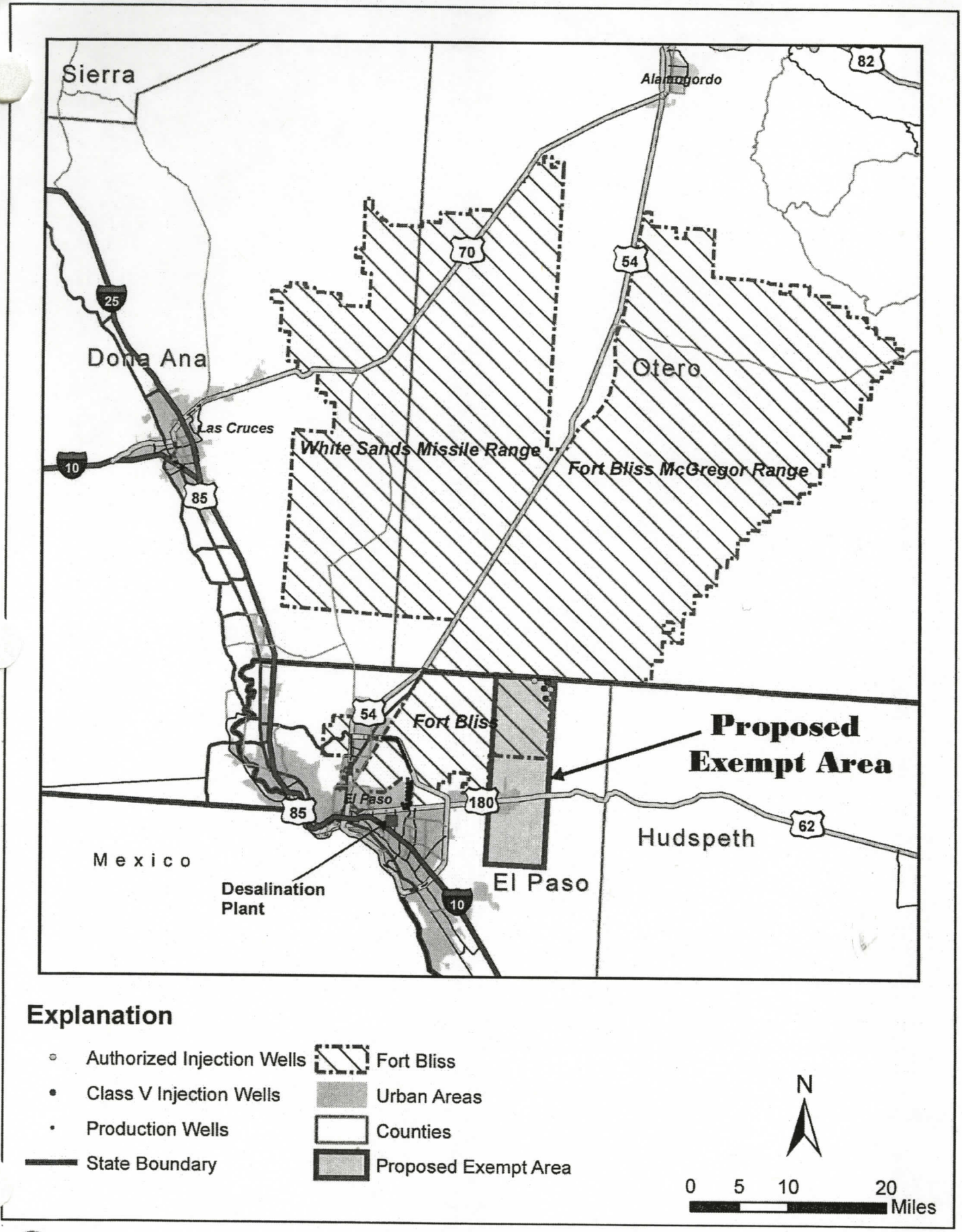
- Class V Injection Wells
- Authorized Injection Wells
- State Boundary
- Fort Bliss
- Proposed Exempt Area
- Concentrate Plume
- One-Quarter Mile Buffer Zone

N

0 1 2 4 Miles

PROPOSED EXEMPT AREA **FIGURE 2**

LBG-GUYTON ASSOCIATES



GENERAL LOCATION MAP

FIGURE 1

LBG-GUYTON ASSOCIATES

Class V Exemption El Paso

Ray Leissner to: David Gillespie 03/14/2012 03:23 PM
Cc: Stacey Dwyer, Philip Dellinger, William Honker, Wren Stenger

From: Ray Leissner/R6/USEPA/US
To: David Gillespie/R6/USEPA/US@EPA
Cc: Stacey Dwyer/R6/USEPA/US@EPA, Philip Dellinger/R6/USEPA/US@EPA, William Honker/R6/USEPA/US@EPA, Wren Stenger/R6/USEPA/US@EPA

David,

I've begun my review of the Class V exemption and something jumps out at me in the cover letter for which I propose to respond. In the cover letter TCEQ claims the aquifer meets 3 of the criteria, 146.4 (a), 146.4(b) (2) and 146.4 (c). Later in the letter they say they provide a demonstration in the application for 146.4(a) and 146.4 (b)(2). This is good because 2 is all they need meet. However, still later in the letter they state "TCEQ may allow EWPU to operate injection wells with the exempt aquifer status if the designation is not disapproved by the Administrator within 45 days of the receipt of this request".

We need to set them straight on this. The 45 days they speak of is in the rules at 144.7 (b)(3). It is applicable only to exemption applications that apply under 146.4(c). They do not have an equivalent rule to 146.4 (c).

In short we need to clarify with them that there is no 45 day time limit on our consideration of the exemption application.

Here's the letter. Do you agree?

Cover letter to exemption application 2-27-12.pdf

Ray Leissner, Env. Eng.
Ground Water / UIC Section (6WQ-SG)
(214) 665 - 7183
USEPA, Region 6

The FIRST STEP in protecting your ground water is to have your well tested.

TCEQ response to comments Rays Copy

Aquifer Exemption in El Paso County

The TCEQ's application for non-substantial program revision was prepared and submitted according to the guidelines provided in Attachment 3 of EPA Guidance #34, "Guidance for Review and Approval of State Underground Control (UIC) Program Revisions to Approved State Programs." To assist EPA in the review of the application, the TCEQ provides you the following information in the application organized under the criteria of Guidance #34:

Item 1—TCEQ order and map of proposed exempted area and Response to Comments;

Item 2—A written description of the proposed exempted aquifer including the name of the formation, subsurface depth or elevation of zone, vertical confinement from other underground sources of drinking water, thickness of proposed exempted aquifer, area of exemption, water quality analysis of the horizon to be exempted;

Item 3—Demonstration that the aquifer does not currently serve as a source of drinking water;

Item 4—Demonstration that the aquifer will not in the future serve as a source of drinking water because it is situated at a depth or location which makes recovery of water for drinking water purposes economically or technically impractical and it is so contaminated that it would be economically or technologically impractical to render that water fit for human consumption.

- **Item 1**

Attachment A is the TCEQ order with a map that depicts the area of the proposed exempted aquifer with delineation of the aquifer exemption boundaries. Refer to the order, Finding 2, for coordinates defining the rectangular exempted aquifer area.

- **Item 2**

The proposed exemption of the Fusselman Formation, Montoya Group, and El Paso Group (hereinafter referred to as the Fusselman, Montoya, and El Paso group) covers a rectangular area of approximately 115 square miles in eastern El Paso County, Texas. The top of exempted aquifer ranges in depth from approximately 1,000 to 4,000 feet below ground as depicted in Figure 18 of the application. The exempted aquifer has a combined thickness of approximately 2,480 feet. Well logs from El Paso's three injection wells for desalination concentrate disposal do not indicate the presence of any aquifers of significant producible quantity overlying the exempted aquifer. Water well records to the south of the injection wells indicate some production of usable water in the 800-foot depth range or shallower. None of these water wells penetrate the exempted aquifer. Based on all of the data from the samples obtained from El Paso's injection wells prior to startup of waste disposal operations, the concentration of total dissolved solids of water in the exempted aquifer is over 8,000 mg/L. Radium-226 +radium 228 activities in the samples range from 15 to 19 picocuries per liter (pCi/L) and gross alpha activities range from 412 to 774 pCi/L. These values exceed the respective primary drinking water standards for these constituents.

no other source of GW?
water wells to the south 800' or shallower

□ **Item 3**

There are no drinking water wells that tap the exempted aquifer. EPWU has demonstrated that the exempted portion of the Fusselman, Montoya, and El Paso group is not currently serving as a source of drinking water for human consumption by conducting a data search and a ground investigation that showed that there are no water wells that withdraw water used for human consumption within the exempted aquifer. A map of water wells in the vicinity of the proposed exempted area is provided as figures 4A and 4B in the application.

□ **Item 4**

The top of the exempted aquifer is located at depths ranging from approximately 1,000 to 4,000 feet below ground. At this depth, the cost to pump, treat and dispose of the brine concentrate to render water from the exempt aquifer fit for human consumption would be economically impractical. Suitable groundwater and surface water sources are available in the area that can be treated through conventional means at a significantly less cost than that of the proposed exempt aquifer.

cost to treat the water AND dispose of the brine concentrate too costly

An economic analysis by EPWU indicates treating groundwater from the proposed aquifer exemption zone would cost $3,000 per acre foot, as compared to a cost of $163 to $1,400 per acre foot from other sources.

cost comparison

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

September 30, 2011

Bridget C. Bohac, Chief Clerk
Office of the Chief Clerk
Texas Commission on Environmental Quality
P.O. Box 13087, Mail Code 105
Austin, Texas 78711-3087

Re: Application by El Paso Water Utilities for Aquifer Exemption, 5X2700062

Dear Ms. Bohac:

Enclosed for filing, please find the original and seven copies of the Executive Director's Response to Public Comment in the above-referenced matter. By this letter, I am also providing a copy of the Response to Comments to all persons on the attached mailing list. If you have any questions about the attached filing, please do not hesitate to call me at 512-239-0612.

Sincerely,

Don Redmond

Don Redmond
Staff Attorney
Environmental Law Division

cc: Mailing list
Enclosure

APPLICATION BY EL PASO	§	BEFORE THE
WATER UTILITIES	§	TEXAS COMMISSION
FOR AQUIFER EXEMPTION	§	ON ENVIRONMENTAL
5X2700062	§	QUALITY

EXECUTIVE DIRECTOR'S RESPONSE TO PUBLIC COMMENT

The Executive Director of the Texas Commission on Environmental Quality (the Commission or TCEQ) files this Response to Public Comment received on the application by El Paso Water Utilities, (Applicant or EPWU) for an aquifer exemption related to Underground Injection Control (UIC) Authorization No. 5X2700062 (referred to herein as the application).

As required by Title 30 Texas Administrative Code (TAC), Section 55.253, before an application is approved, the Executive Director prepares a response (RTC) to all timely, relevant and material, or significant comments received during the comment period. This RTC addresses all timely public comments received, whether or not withdrawn. If you need more information about this application please call the TCEQ's Public Education Program at 1-800-687-4040. General information about the TCEQ can be found at our website at www.tceq.tx.gov. TCEQ's Office of the Chief Clerk received timely comments on the application from Mr. Juan Navar Sr., on behalf of Wonders of Ancient Cultures and Modern West, LLC. (Ancient Wonders, LLC), U.S. Representative Silvestre Reyes and Texas State Representative Chente Quintanilla.

BACKGROUND

Description of Facility

El Paso Water Utilities (EPWU) currently operates a groundwater desalination plant for public water supply and uses Class V injection wells for the disposal of the desalination concentrate wastewater. The injection wells are located within the property of the Fort Bliss Military Reservation, approximately 22 miles northeast of the Kay Bailey Hutchinson Desalination Plant in northeastern El Paso County, Texas, and approximately 12 miles north of U.S. Highway 180. TCEQ Underground Injection Control (UIC) Class V Authorization No. 5X2700062 authorizes three constructed injection wells and a fourth well that has not been drilled. EPWU has been operating these disposal wells since 2005. EPWU applied to the TCEQ for the designation of an exempt aquifer associated with their injection well operation.

4th as of yet not drilled

Aquifer Exemption Application

An aquifer exemption is not a permit that is granted to an applicant. Rather, an aquifer exemption is a designation that a certain aquifer, or portion of an aquifer, is not considered as an underground source of drinking water (USDW) under the UIC program requirements. The approved aquifer exemption would enable EPWU to eliminate the step of diluting the desalination concentrate prior to disposal. If the

aquifer exemption is granted, EPWU can request modification of its Class V injection well authorization, to increase the concentration of constituents in the desalination concentrate authorized for disposal. Desalination concentrate consists of salts and other constituents that have been removed from groundwater and concentrated by the desalination process. Presently, in order to meet concentration limits for injection well disposal of wastewater containing certain constituents that have been concentrated by the desalination process, EPWU dilutes the desalination concentrate with fresh water prior to disposal. The approval of the aquifer exemption and subsequent revision to the Class V injection well authorization will conserve the amount fresh water that will be available for drinking water.

What will be the allowable thresholds for each contaminants concentration

OK provide concentration do not exceed Class I limits

Although the groundwater in the formation in which EPWU injects the desalination concentrate is not used for consumption, it is currently classified as a USDW because it contains groundwater with a concentration of less than 10,000 milligrams per liter (mg/l) total dissolved solids. USDWs must be protected from injection well operation that would result in pollution of the water in the USDW. The designation of an exempt aquifer exemption would remove the receiving formations' status so that the aquifer would not be considered a USDW under the regulatory definition.

The state criteria for exempting an aquifer from USDW protection requirements are provided in 30 TAC § 331.13. An aquifer or portion of an aquifer may be designated as an exempted aquifer if it does not currently serve as a source of drinking water for human consumption, and until the exempt status is removed, it will not serve in the future as a source of drinking water for human consumption. EPWU's application demonstrates that the aquifer does not currently and will not serve in the future as a source of drinking water because its depth and quality make recovery of water for drinking water purposes economically or technologically impractical. An aquifer proposed for exemption under the requirements of 30 TAC § 331.13 must be approved first by the TCEQ and then by the U.S. Environmental Protection Agency (EPA) as a revision to the state's authorized UIC program before it is effective.

The proposed aquifer exemption extends over a rectangular area of 115 square miles, approximately 5.98 miles east to west and 19.2 miles north to south, in northeastern El Paso County. The subsurface formations for which the aquifer exemption is sought include the Fusselman, Montoya, and El Paso group approximately 2,480 feet in thickness, the top of which ranges from 1,000 to 4,000 feet below ground level.

Procedural Background

The application was received on August 21, 2008. Revisions to the application were received in April 2010 and April 2011. A combined Notice of Application and Preliminary Decision for an Aquifer Exemption and Notice of Public Meeting was issued by TCEQ on June 7, 2011. The notice was mailed to the application mailing list and newspaper published in English in the *El Paso Times* on June 21, 28 and July 5, 2011. The notice was also newspaper published in Spanish in *El Diario* on June 21, 28, and July 5, 2011. A public meeting was conducted by TCEQ at the Tech H20 Center in El Paso on July 14, 2011. The public comment period for the application ended on August 4, 2011.

public notice data

This application is not subject to the procedural requirements adopted pursuant to House Bill 801, 76th Legislature, 1999.

Access to Rules, Laws and Records

TCEQ rules are available at the Texas Secretary of State website:
http://www.sos.state.tx.us
Texas Statutes are available at the Texas Constitution and Statutes website:
http://www.statutes.legis.state.tx.us/Index.aspx
Other useful information is available at the TCEQ Website:
http://www.tceq.texas.gov/

COMMENTS AND RESPONSES

COMMENT No. 1:

Mr. Juan Navar, Sr. commented that Ancient Wonders, LLC, and other adjacent landowners would be adversely affected because injected water will contaminate potable water that currently exists in one or more aquifers under Ancient Wonders, LLC's property.

RESPONSE No. 1:

For clarification, this comment may refer to continued operation of EPWU's authorized Class V waste disposal injection wells. The Executive Director is not reviewing an application or considering public comments regarding EPWU's present or continued Class V waste disposal operation. Class V injection wells are authorized by rule. Applications for Class V injection wells, authorized by rule, are not subject to public notice and comment requirements. The application under review is EPWU's application for an aquifer exemption.

I do not draw this assumption.

An aquifer or a portion of an aquifer may be designated as an exempted aquifer if it does not currently serve as a source of drinking water for human consumption and it will not serve as a source of drinking water for human consumption in the future because it is situated at a depth or a location which makes recovery of water for drinking purposes economically or technically impractical or it is so contaminated that it would be economically or technically impractical to render that water fit for human consumption in accordance with 30 TAC §331.13.

The application demonstrates that the groundwater in the proposed exempted aquifer is not currently being used for drinking water. EPWU conducted a search of the state public water supply databases (TCEQ Public Drinking Water Section and New Mexico Environmental Department Drinking Water Bureau), water well records (driller's logs), public sources of data, and conducted an on-the-ground site survey. The application indicates that these searches and survey concluded that no public water supply systems in Texas or New Mexico utilize the aquifer proposed for exemption as a source of drinking water and that the aquifer has not been and is not currently utilized as a domestic, agriculture, or industrial supply of water.

The application demonstrates that the groundwater in the proposed exempted area will not be used for drinking water in the future because it is situated at a depth and location which makes recovery of water for drinking water purposes economically or technically impractical to render the water fit for human consumption. Data presented in the application also indicate that water in the aquifer proposed for exemption has a high concentration of radionuclides (gross alpha radiation concentration ranges from 412 to 774 picocuries per liter (pCi/l) and combined radium-226 and radium-228 concentration is approximately 19 pCi/l) and total dissolved solids (approximately 8,800 mg/l). These naturally-occurring concentrations would require treatment before use as drinking water. The application includes an economic analysis that indicates an approximate production (pumping and treatment) cost of $3,000 per acre-foot of water in the exempted formations, in contrast with production costs ranging from $300 to $1,400 per acre-foot for alternate sources of drinking water in the region. Alternate sources of drinking water are available in the El Paso region that are of better quality with significantly lower production cost.

showing that the water is not potable is a good response

Because this comment may refer to continued operation of EPWU's authorized Class V waste disposal injection wells, the Executive Director is including here a description of the redundant safeguards that are the basis of the TCEQ's UIC program. The purpose of the TCEQ's UIC program is to prevent underground injection that may pollute fresh water in accordance with the Texas Water Code Chapter 27 and TCEQ rules found in 30 TAC Chapter 331. EPWU's Class V authorization is subject to terms and conditions that are imposed to protect fresh water from pollution, including: siting requirements; limits on injected water quality, injection volume, injection rate, and injection pressure; construction requirements; monitoring and reporting requirements; mechanical integrity requirements; the depth of the injection zone; the presence of a thick sequence of low permeability rocks as a confining zone above the injection zone; and the design, construction, and monitoring of the injection wells.

The Executive Director has reviewed the application and determined that it satisfies the requirement that the aquifer or portion of aquifer proposed to be exempted does not currently and will not in the future serve as a source of drinking water for human consumption.

COMMENT No. 2:

Mr. Juan Navar Sr. commented that a study by the University of Texas System (UT) study found a vast network of underground caverns and cracks in the bedrock that connect many of the aquifers and that aquifers in the area of the proposed aquifer exemption are not completely isolated from other aquifers in the area. Mr. Navar commented further that the UT study found that if contaminated water is injected under pressure into one aquifer, the contaminated water would be forced through the network of caverns and cracks into many nearby aquifers.

this would be beneath all USDWs

RESPONSE No. 2:

For clarification, this comment may refer to continued operation of EPWU's authorized Class V waste disposal injection wells. The Executive Director is not reviewing an

I wonder how they drew that assumption.

application or considering public comments regarding EPWU's present or continued Class V waste disposal operation. The application under review is EPWU's application for an aquifer exemption.

The application indicates that the Class V injection wells are sited to ensure that a confining zone with sufficient thickness overlies the injection zone where the fluids are injected in the proposed exempted aquifer.

EPWU is not authorized to inject into the sited Class V wells under pressure. EPWU's UIC Class V Authorization No. 5X2700062 authorizes an injection pressure of zero pounds per square inch (0 psi), meaning that the injection is not under pressure and is limited to gravity-feed. Please see the additional safeguards for fresh water supplies that are the basis of the TCEQ's UIC regulatory requirements described under Response No. 1 above. The Executive Director has not reviewed the UT study and has been unable to locate the referenced study. – I trust they looked for it.

The Executive Director has reviewed the application in accordance with the applicable rules and determined that it appropriately describes vertical confinement of the proposed exempted aquifer.

COMMENT No. 3:

Mr. Juan Navar Sr. commented that the ground is porous in the area and that contaminated water would possibly rise to the surface adversely affecting vegetation. Mr. Navar further commented that the high pressure injection proposed would increase the likeliness of contaminated water rising to the surface and adversely affecting vegetation.

RESPONSE No. 3:

For clarification, this comment may refer to continued operation of EPWU's authorized Class V waste disposal injection wells. The Executive Director is not reviewing an application or considering public comments regarding EPWU's present or continued Class V waste disposal operation. The application under review is EPWU's application for an aquifer exemption.

The application indicates that the top of the proposed exempted aquifer ranges from 1,000 to 4,000 feet below ground level and is 2,480 feet thick. The authorized Class V injection wells are sited to ensure that a confining zone with sufficient thickness overlies the injection zone where the fluids are injected. The application indicates that surface deposits within the area of the requested aquifer exemption are composed mainly of unconsolidated sand and silt, with some clay. These deposits are porous and would allow downward infiltration from the surface into subsurface units. However, the surface deposits are separated from the injection zone by layers of the confining zone, including the low permeability rocks of the Canutillo Formation and the Percha Shale. Therefore, the injected fluids, which are not injected under pressure, are effectively isolated by the low-permeability confining formation above the injection zone. Redundant safeguards incorporated into the TCEQ UIC regulations are designed to eliminate the potential for injected fluids to rise through the subsurface formations and

contaminate surface water or impact surface vegetation. Please see the description of these UIC safeguards under Response No. 1 above.

The Executive Director has reviewed the application in accordance with the requirements and determined that it appropriately describes the subsurface depth or elevation and thickness of the proposed exempted aquifer and that it appropriately describes vertical confinement of the proposed exempted aquifer.

COMMENT No. 4:

Mr. Juan Navar Sr. recommends denial of the application.

RESPONSE No. 4:

The Executive Director reviewed the application and determined that it meets the requirements of 30 TAC § 331.13 for the proposed designation of an exempted aquifer.

COMMENT NO. 5:

U.S. Representative Silvestre Reyes and Texas State Representative Chente Quintanilla expressed support for the approval of the aquifer exemption application.

Response No. 5:

The Executive Director acknowledges these comments supporting the application

COMMENT No. 6:

Mr. Juan Navar Sr. requests a contested case hearing on the application on behalf of Ancient Wonders, LLC.

RESPONSE No. 6:

Timely filed requests for a contested case hearing, that are not withdrawn, will be considered by the commission in accordance with 30 TAC §§55.254 and 55.255. The requestor(s) will be notified in writing when the request is scheduled for consideration. The TCEQ Commissioners will consider any such requests during a regularly scheduled Commission meeting that is open to the public, and make a determination as to whether or not the request will be granted. If a request is granted, the matter will be referred to the State Office of Administrative Hearings for a formal, legal proceeding, conducted in a manner similar to civil trials in state district court.

Mr Navar was found not to have standing per the application

CHANGES MADE IN RESPONSE TO COMMENT

No changes to the draft aquifer exemption order have been made in response to public comment.

Respectfully submitted,
Texas Commission on Environmental Quality

Mark R. Vickery, P.G.
Executive Director

Robert Martinez, Director
Environmental Law Division

By Don Redmond
Don Redmond, Attorney
Environmental Law Division
State Bar No. 24010336
P. O. Box 13087, MC 173
Austin, Texas 78711-3087
Phone: 512.239.0612

By Diane Goss
Diane Goss, Staff Attorney
Environmental Law Division
State Bar No. 24050678
P.O. Box 13087, MC 173
Austin, Texas 78711-3087
(512) 239-5731

REPRESENTING THE
EXECUTIVE DIRECTOR OF THE
TEXAS COMMISSION ON
ENVIRONMENTAL QUALITY

TCEQ DOCKET NO.

APPLICATION BY EL PASO WATER UTILITIES FOR AN AQUIFER EXEMPTION	§ § §	**BEFORE THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY**

DRAFT AQUIFER EXEMPTION ORDER

The Texas Commission on Environmental Quality (TCEQ) finds that:

1. On August 21, 2008, El Paso Water Utilities (EPWU) submitted an application to request designation of an exempted aquifer under 30 TAC Section 331.13.

2. The aquifer requested to be exempted consists of a portion of the Fusselman Formation, Montoya Group, and El Paso Group (hereinafter referred to as the Fusselman, Montoya, and El Paso group) with a combined thickness of approximately 2,480 feet and a top ranging from approximately 1,000 to 4,000 feet below ground as depicted in Figure 18 of the application providing a structure map on the top of the Fusselman. The area of the proposed exempt aquifer is a rectangle of approximately 115 square miles, extending approximately 19.2 miles from north to south and 5.98 miles from east to west and is located in El Paso County. The northwest corner of the proposed exempt aquifer is located at latitude 32° 00' 13.38" N, longitude 106° 11' 49.28" W; the southwest corner is located at latitude 31° 43' 30.00" N, longitude 106° 11' 49.28" W; the southeast corner at latitude 31° 43' 30.00" N, longitude 106° 05' 42.12" W; and the northeast corner at latitude 32° 00' 12.74" N, longitude 106° 05' 42.12" W. Maps depicting the exempted aquifer area are attached.

3. The groundwater in the portion of the Fusselman, Montoya, and El Paso group described in Finding #2 contains a concentration of up to 8,800 mg/l total dissolved solids (TDS). Because the groundwater TDS concentration is less than 10,000 mg/l, according to 30 TEX. ADMIN. CODE §§ 331.2 and 331.13, this portion of the Fusselman, Montoya, and El Paso group is considered an underground source of drinking water unless it is designated an exempted aquifer.

4. EPWU currently operates a groundwater desalination plant for public water supply, with injection wells for safe management and disposal of the resulting desalination concentrate wastewater. EPWU requests the designation of the exempted aquifer in conjunction with the use of injection wells authorized under TCEQ Authorization No. 5X2700062 for injection of desalination concentrate that does not meet all primary and secondary drinking water standards.

5. The Class V injection wells associated with the proposed aquifer exemption were authorized by TCEQ on July 13, 2005 and are located on Fort Bliss Military Reservation approximately twelve miles north of State Highway 180 and 22 miles northeast of the Kay Bailey Hutchinson Desalination Plant in El Paso County, Texas. The Class V injection wells are located as follows: the well designated as JDF-1 at latitude 31° 59' 49" N, longitude 106° 06' 25" W; the well designated as JDF-2 at latitude 31° 58' 24" N, longitude 106° 06' 30" W; the well designated as JDF-3 at latitude 31° 59' 15" N, longitude 106° 06' 43" W; the well designated as JDF-4 at latitude 31° 59' 55" N, longitude 106° 07' 45" W; and the well designated as JDF-5 at latitude 31° 59' 13" N, longitude 106° 06' 05" W.

6. An exempted aquifer is an aquifer or a portion of an aquifer which meets the criteria for fresh

water but has been designated an exempted aquifer by the commission after notice and opportunity for hearing.

7. An aquifer or portion of an aquifer may be designated as an exempted aquifer if the following criteria are met:

   (1) It does not currently serve as a source of drinking water for human consumption; and

   (2) Until exempt status is removed according to 30 TAC §331.13(f), it will not in the future serve as a source for human consumption because:

      (A) It is mineral, hydrocarbon or geothermal energy bearing with production capability;

      (B) It is situated at a depth or location which makes recovery of water for drinking water purposes economically or technically impractical;

      (C) It is so contaminated that it would be economically or technologically impractical to render that water fit for human consumption; or,

      (D) It is located above a Class III well mining area subject to subsidence or catastrophic collapse.

8. EPWU has demonstrated that the portion of the Fusselman, Montoya, and El Paso group described in Finding #2 is not currently, nor has ever been, a source of drinking water for human consumption by conducting a data search and a ground investigation that showed that there are no water wells that withdraw water used for human consumption within the exempted aquifer.

9. EPWU has demonstrated that the portion of the Fusselman, Montoya, and El Paso group described in Finding #2 is situated at a depth (1,000 to 4,000 feet at top) which makes recovery of water for drinking water purposes economically or technically impractical.

10. The TCEQ also notes that water samples taken from the Fusselman, Montoya, and El Paso group exhibit a high concentration of certain radionuclides (gross alpha and radium 226 & 228).

11. Notice of the aquifer exemption was issued June 7, 2011, published in the *El Paso Times* on June 21, 28 and July 5, 2011 and *El Diario* on June 21, 28, and July 5, 2011, and mailed to the same recipients required for notice of an injection well permit application.

12. The notice described the process for submitting comments and requesting a hearing on the aquifer exemption.

13. A public meeting was held on Thursday, July 14, 2011, 7:00 p.m., at Tech H2O Center, 10751 Montana Ave., El Paso, Texas 79935.

14. The Executive Director of the Texas Commission on Environmental Quality provided a response to all timely, relevant and material, or significant public comments on the application.

Now, therefore, be it ordered by the Texas Commission on Environmental Quality that:

1. The portion of the Fusselman, Montoya, and El Paso group described in Finding #2 be designated as an exempted aquifer under 30 TAC § 331.13(c);

2. The Executive Director of the Texas Commission on Environmental Quality submit a program revision to the United States Environmental Protection Agency (EPA) under 40 CFR §§ 144.7, 146.4, and 145.32 to reflect this aquifer exemption designation for the Underground Injection Control program for the State of Texas; and

3. No designation of an exempted aquifer shall be final until approved by the EPA as part of the delegated Underground Injection Control Program.

Issue Date:

Texas Commission on
Environmental Quality

_____

Bryan Shaw, Chairman

MAILING LIST
EL Paso Water Utilities

The Honorable Chente Quintanilla
State Representative, District 75
State of Texas, House of Representatives
120 N. Horizon, Suite 112-A
El Paso, Texas 79927
(915) 859-3111 (PH)
(915) 859-3120 (FAX)
chente.quintanilla@house.state.tx.us

The Honorable Silvestre Reyes
Congress of the United States, House of Representatives
310 North Mesa, Suite 400
El Paso, Texas 79901
(915) 534-4400 (PH)
(915) 534-7426 (FAX)

Mario Aguilar
Lower Valley Water District
PO BOX 909
Clint, Texas 79836-0909

Jeff Bennett PG
BBNP-SCRM
266 Tecolote Dr
BBNP, Texas 79834

Buchanan Easley
4020 Summit Ct
Fairview, Texas 75069-1183

Robert Halpern
La Frontera Publications INC
Drawer P
110 N Highland
Marfa, Texas 79843-6500

Andrew S Miller
Kemp Smith LLP
Ste 1150
816 Congress Ave
Austin, Texas 78701-2442

Nancy E Nye Pretreatment Program Mgr
El Paso Water Utilities
PO BOX 511
El Paso, Texas 79961-0001

David O Ornelas Env Comp Manager
El Paso Water Utilities
209 N Lee St
El Paso, Texas 79901-1707

Carlos A Rincon
El Paso Border Office
Ste 100
4050 Rio Bravo St
El Paso, Texas 79902-1061

Ellen A Smith PE Director
City of El Paso Environmental Services Dep
7969 San Paulo Dr
El Paso, Texas 79907-1246

Mr. Juan M. Navar, Sr.
Wonders of Ancient Cultures
Modern West LLC
10828 Sombra Verde Dr
El Paso, Texas 79935-3623

Mr John Barrerra
NEPA Coordinator
Directorate of Environment
BLDG 624 Pleasanton Road
Fort Bliss, Texas 79916-6812

Mr. Edmund G. Archuleta
El Paso Water Utilities
1154 Hawkins Blvd.
El Paso, Texas 79925

Brad Cross
LBG-Guyton
1101 South Capital of Texas Highway,
Suite B220
Austin, TX 78746

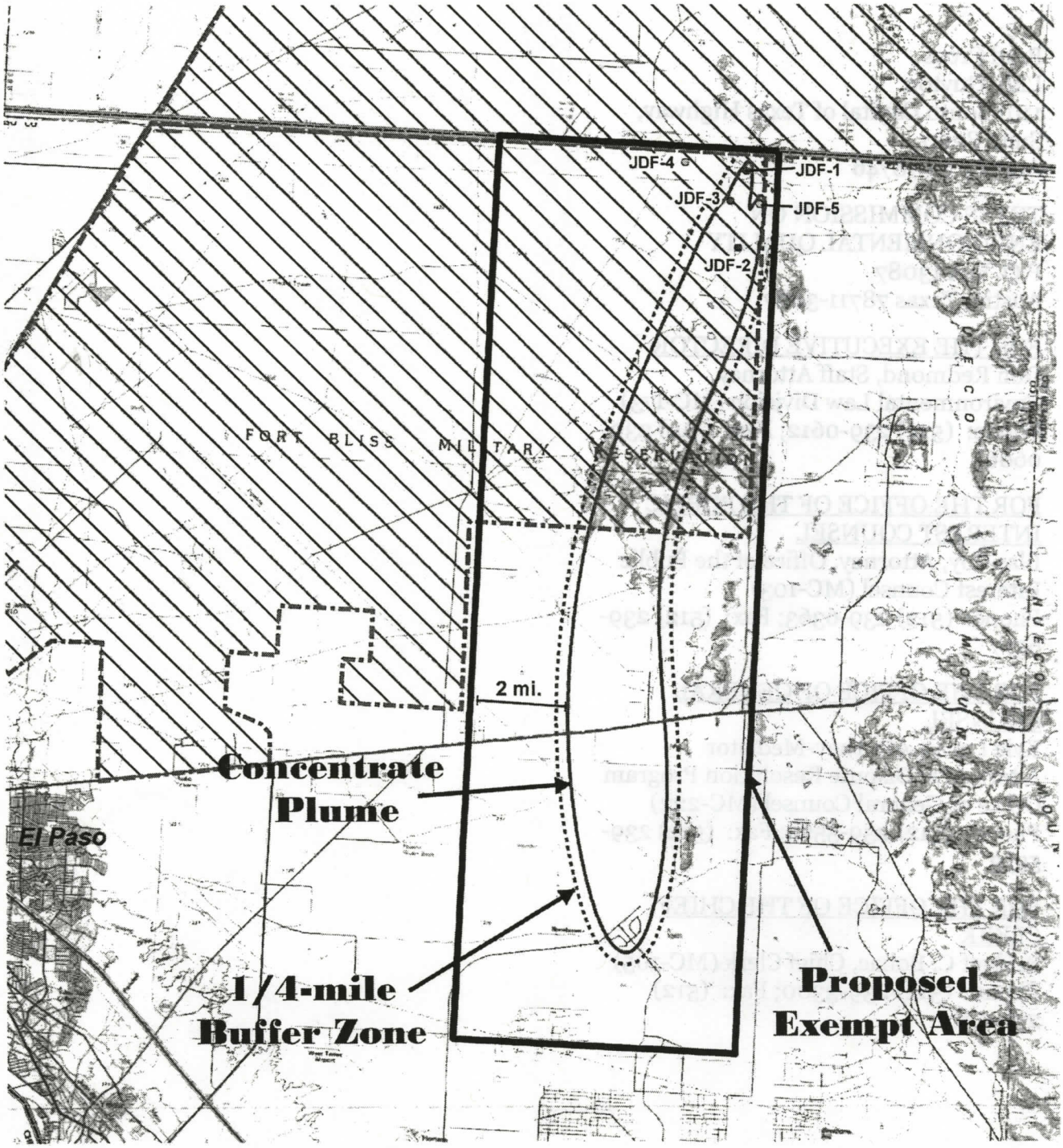
TEXAS COMMISSION ON
ENVIRONMENTAL QUALITY
P.O. Box 13087
Austin, Texas 78711-3087

FOR THE EXECUTIVE DIRECTOR
Don Redmond, Staff Attorney,
Environmental Law Division (MC-173)
Phone: (512) 239-0612; Fax: (512) 239-0606

FOR THE OFFICE OF THE PUBLIC INTEREST COUNSEL
Blas Coy, Attorney, Office of the Public Interest Counsel (MC-103)
Phone: (512) 239-6363; Fax: (512) 239-6377

FOR THE OFFICE OF GENERAL COUNSEL
Kyle Lucas, Attorney-Mediator
Alternative Dispute Resolution Program
Office of General Counsel (MC-222)
Phone: (512) 239-5525; Fax: (512) 239-5533

FOR THE OFFICE OF THE CHIEF CLERK
Bridget C. Bohac, Chief Clerk (MC-105)
Phone: (512) 239-3300; Fax: (512) 239-3311



Explanation

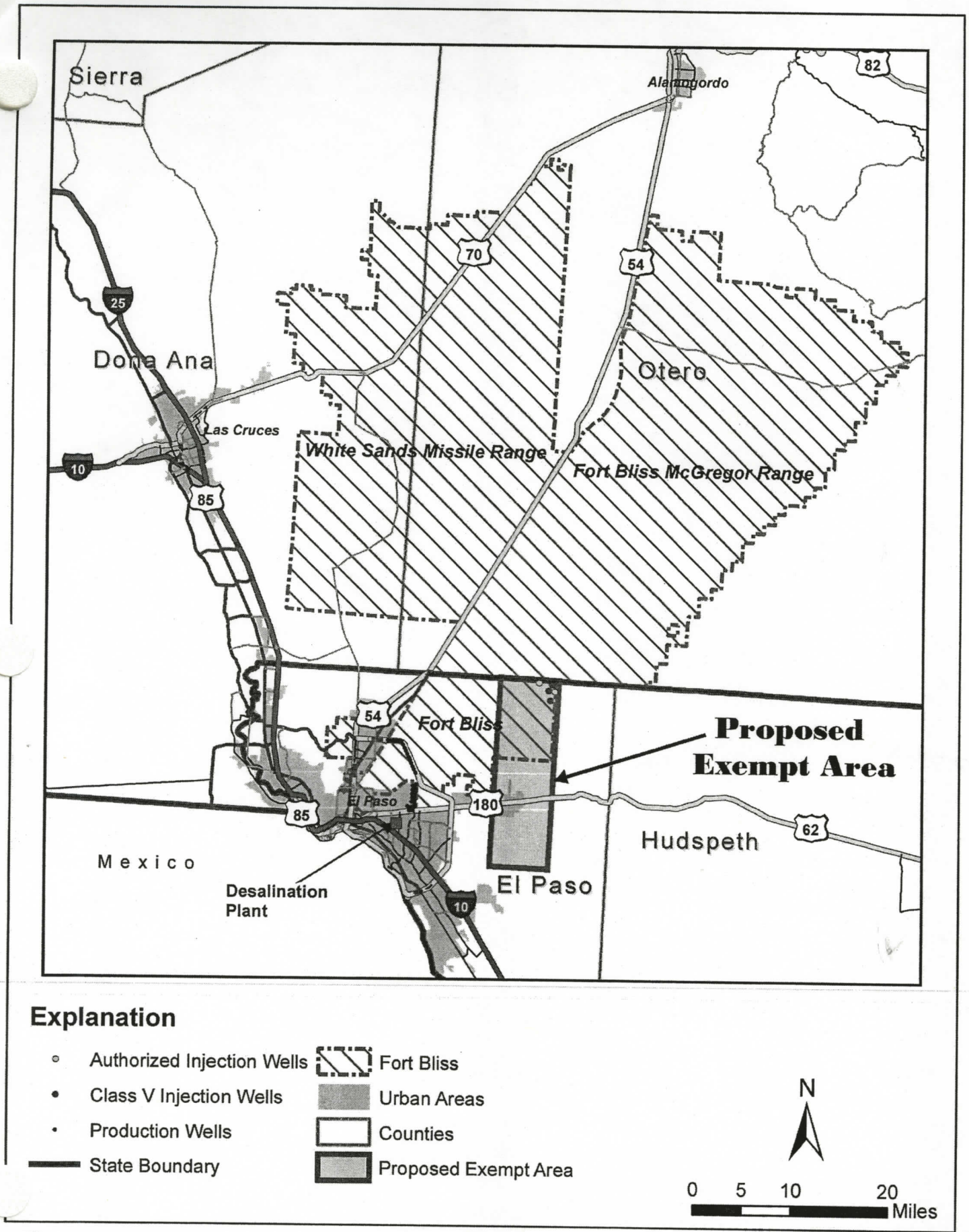
- Class V Injection Wells
- Authorized Injection Wells
- State Boundary
- Fort Bliss
- Proposed Exempt Area
- Concentrate Plume
- One-Quarter Mile Buffer Zone

N

0 1 2 4 Miles

PROPOSED EXEMPT AREA **FIGURE 2**

LBG-GUYTON ASSOCIATES



GENERAL LOCATION MAP **FIGURE 1**

LBG-GUYTON ASSOCIATES

Reviewed by Ray 3/15/12

Included in this package marked EPWU & TCEQ Correspondence or Ag Exmp.

- July 28, 2011 ltr from St. Rep. Reyes in support of exemption
- July 11, 2011 ltr from St Rep. Quintanilla " " " "
- June 7, 2011 ltr TCEQ → EPWU with instructions for public notice
  - notice set public meetings
  - gave 30 days to comment/request hearing
    comment period expires at end of public meeting
    OR 30 days after notice is published

email Chad Cross → Bryan Smith on MODFlow formulas for transport & fate

- April 23, 2010 ltr LBG Guyton → TCEQ
  response to NOD #1 – Analysis of concentrate in Appendix C
  - 50 yr projection of water quality parameters
  - redone potentiometric surface study
    - fluid flow to S/SW
    - hy. gradient .008 ft/ft 60° W of S
    - hy gradient change to .003 ft/ft
    - Numerical dispersion reduced & eliminated movement into NM
  - model based on plume generated in 50 years

ISSUE – should exemption have time limit on it?

- April 5, 2011 ltr LBG → John Hall, NMED
  informs NMED that modifications to the app/continue to reflect no plume movement into NM

April 5, 2011 ltr LBG → Bryan Smith, TCEQ
Summerizes changes made to appl.

model is based on injection into 4 wells
model

Rays Copy

LBG-GUYTON ASSOCIATES

PROFESSIONAL GROUNDWATER AND ENVIRONMENTAL ENGINEERING

1101 CAPITAL OF TEXAS HIGHWAY
SUITE B-220
AUSTIN, TX 78746
512-327-9640
FAX: 512-327-5573
www.lbg-guyton.com

April 23, 2010

Mr. Ben Knape, P.G.
Team Leader
Underground Injection Control Permits Team
Radioactive Materials Section
Mail Code 233
P.O. Box 13087
Austin, Texas 78711-3087

Re: Technical Notice of Deficiency No. 1
Application for Aquifer Exemption
Class V Authorization 5X2700062, Tracking No. 12421324-1
CN602957060/RN104809389
Kay Bailey Hutchison Desalination Plant

Dear Mr. Knape:

In response to the Texas Commission on Environmental Quality's (TCEQ) correspondence dated June 4, 2009, enclosed you will find one original and two copies of the revised Aquifer Exemption application.

El Paso Water Utilities (EPWU) requests the designation of an exempted aquifer in conjunction with the use of its Class V injection wells, TCEQ Authorization No. 5X2700062. EPWU requests that the portions of the aquifer described in its April 2010 application be exempt for purposes of the use of Class V injection wells to inject discharged water from a desalination plant used to convert brackish groundwater to potable water.

The enclosed documents should replace the current application package you have on file. While the revised document addresses each of the comments made in your June 4, 2009 correspondence, a short summary of the three primary issues follows:

1) *Provide copy of laboratory analysis of concentrate* – EPWU submitted a copy of the analytical report for an undiluted concentrate sample collected from the Kay Bailey Hutchison Desalination Facility to the TCEQ on September 9, 2009. A copy of the report has also been included in the revised Aquifer Exemption application as Appendix C. Moreover, Table 2 of the revised Aquifer Exemption application provides a 50-year projection of water quality parameters.

2) *Potentiometric Surface* – The potentiometric surface has been reevaluated and we have relied on published EPA documents, static water level measurements in the injection wells, previously published cross-sections, and a geologic structure map for the top of the Fusselman to refine our assessment of the regional potentiometric surface, hydraulic gradients, and potential flow directions. More specifically, in accordance with your June 4, 2009 letter, we have revised the steady-state potentiometric surface and created a structure map of the top of the Fusselman. These revisions are shown in Figures 17 and 19 of the revised Aquifer Exemption application. These changes were used to revise the geologic conceptual model. The data supports a south to southwesterly flow direction which has been incorporated into the revised conceptual model. These issues are described in detail in the hydrogeology and modeling sections of the application.

3) *Hydrogeologic Gradient* – Based upon your June 4, 2009 letter requesting justification of our modeling, we have revised the direction and magnitude of the groundwater gradient used to model the extent of the injectate plume. A brief summary of the analysis supporting the revision follows. Static water level measurements in the three injection wells indicate a hydraulic gradient of 0.008 foot/foot in the direction of 60 degrees west of south. However, the northwest-southeast faulting is expected to have some impact on local water levels and flow directions. EPA documents (Transboundary Aquifers of the El Paso/Ciudad Juarez/Las Cruces Region, 1997) support a southerly regional flow direction in the nearby Hueco-Tularosa aquifer but indicates that flow directions near the injection wells are influenced by complex geology. For the purposes of this evaluation, it was assumed that regional groundwater flow was to the south in the injection zone. While the local hydraulic flow gradient measured at the site (0.008 foot/foot) was considered in developing the flow model, it was determined that this local gradient did not represent regional conditions. This decision was based on two observations. First, the complex nature of the geology and faulting in the area of the wells used to estimate the gradient. Second, the local gradient is significantly higher than the hydraulic gradient in the nearby Hueco-Tularosa aquifer. EPA indicates that the southerly gradient in the Hueco-Tularosa aquifer is about 0.0015 foot/foot. Therefore, it was determined that the regional hydraulic gradient in the Fusselman-Montoya-El Paso Group was 0.003 foot/foot. These issues are described in detail in the hydrogeology and modeling sections of the application.

went to smaller gradient from .008 ft/ft to .003 ft/ft

As previously discussed, the original modeling effort was based on an ultra-conservative modeling approach that produced an extensive proposed exempt area. Based on additional discussions with the TCEQ since the original submittal, LBG-Guyton Associates has refined the numerical model grid to reduce artificial numerical dispersion in the model. This refinement resulted in an improved model that reduced the numerical dispersion that caused the original exempt area to extend into New Mexico. The refined model results in a smaller proposed area of exemption and predicts that the plume does not migrate into the State of New Mexico.

?

They reduced the gradient in the zone from .008 to .003 ft/ft & reduced numerical dispersion & the plume now does not move into NM.

Therefore, we will be requesting a withdrawal of the aquifer exemption request from the New Mexico Environment Department.

Since our original Aquifer Exemption submittal to the TCEQ in August 2008, numerous discussions with agency staff has resulted in the refinement of a proposed exempt area that is key to the successful operation of the Kay Bailey Hutchison Joint Desalination facility. This revised application package clearly resolves several discussed issues, including:

- The areal extent of the aquifer exemption request is based on the plume that would be generated from the injection of concentrate at a constant rate of 3 MGD for 50 years. Actual rate of injection for the concentrate will be based on plant operation that will be governed by the availability of surface water. Specifically, during times of "full" river allocation, groundwater pumpage from the Hueco Bolson and operation of the plant will be minimal. Under "drought" conditions, groundwater from the Hueco Bolson and operation of the plant will be maximized to make up for the shortage of surface water. In addition to drought protection, the plant will be used to provide for growth, meet peak demands, and be used if there is a disruption in other supplies. It is anticipated that the actual amounts of injection will be, on the average, less than the constant rate of 3 MGD for 50 years. As such, the area requested for the aquifer exemption is considered to be more than sufficient.

Should exemption have time limit?

- The aquifer is not a source of drinking water for human consumption. Its remoteness and depth renders it an economically and/or technologically impractical source of drinking water;

- The aquifer does not represent a future source of drinking water because in addition to having a TDS level above 8,000 mg/L, the aquifer does not meet primary water quality standards for arsenic, gross alpha, nitrite, and radium, making the use of groundwater from the aquifer impractical for human consumption. The undiluted, non-hazardous concentrate does not significantly affect the existing groundwater quality of the proposed exempt aquifer. Extensive research has been conducted at the University of Texas at El Paso's Center for Inland Desalination Systems on the use of membrane technology in the desalination of brackish water and wastewaters. The center has determined that in order for the Fusselman-Montoya-El Paso Group groundwater to be used as a future source of drinking water, it would have to be subjected to rigorous treatment to remove the natural contaminants that are currently present and that the injection of the concentrate would not render the groundwater either less treatable or more costly to treat than it already is;

- Alternative sources of drinking water are available in the area, are of higher quality, and can be produced at a significantly less cost per acre-foot basis;

We sincerely appreciate your consideration of the revised application package and look forward to a favorable response from the Underground Injection Control Permits Team in the near future.

Sincerely,

LBG-GUYTON ASSOCIATES

Brad L. Cross
Associate

Rons copy
for mailing

LBG-GUYTON ASSOCIATES

PROFESSIONAL GROUNDWATER AND ENVIRONMENTAL ENGINEERING

1101 CAPITAL OF TEXAS HIGHWAY
SUITE B-220
AUSTIN, TX 78746
512-327-9640
FAX: 512-327-5573
www.lbgweb.com

April 5, 2011

Mr. John S. Hall
UIC Coordinator
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building
P.O. Box 26110
Santa Fe, New Mexico 87505

Re: El Paso Water Utilities Aquifer Exemption Request

Dear Mr. Hall:

On February 1, 2011, El Paso Water Utilities (EPWU) received a letter from the Texas Commission on Environmental Quality (TCEQ) requesting clarification on several issues related to the proposed aquifer exemption. We have modified sections of the application in order to clarify several points. While modifications were made to the draft application, there continues to be no plume migration into the state of New Mexico.

In order to assure the state of New Mexico remains up to date on the application, please find attached a revised application text (April 2011) as well as affected figures, tables, and appendices. Please replace the affected pages in your April 2010 application.

As we progress through the approval process, we will continue to keep you updated on any changes. In the meantime, should you have any questions, please do not hesitate to give me a call at (512) 327-9640.

Sincerely,

LBG-GUYTON ASSOCIATES

Brad L. Cross
Associate

cc: Mr. Scott Reinert, EPWU
Mr. Ben Knape, TCEQ

Rush copy

LBG-GUYTON ASSOCIATES

PROFESSIONAL GROUNDWATER AND ENVIRONMENTAL ENGINEERING

1101 CAPITAL OF TEXAS HIGHWAY
SUITE B-220
AUSTIN, TX 78746
512-327-9640
FAX: 512-327-5573
www.lbgweb.com

April 5, 2011

Mr. Bryan S. Smith, Project Manager
MC-233
Underground Injection Control Permits Team
Radioactive Materials Division
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, Texas 78711-3087

Re: EPWU Application for Aquifer Exemption
Class V Authorization 5X2700062, Tracking No. 12421324-1
CN602957060/RN104809389
Kay Bailey Hutchison Desalination Plant

Dear Mr. Smith:

In response to your correspondence dated February 1, 2011, El Paso Water Utilities (EPWU) is pleased to provide additional clarification on the subject aquifer exemption in order for the Texas Commission on Environmental Quality's (TCEQ) Underground Injection Control (UIC) staff to continue the technical evaluation of the aquifer exemption application. We have modified sections of the application in order to clarify specific points discussed in your correspondence and are including all revised documents in triplicate. To briefly summarize the changes made, your comments are repeated below along with an EPWU response.

TCEQ Comment: **Please indicate in the reservoir modeling section of the application (and any other appropriate section) the number of wells that the model is based on and how much of the 3 MGD injectate is going into each well.**

EPWU Response: The model is based on injection into four wells, including active wells JDF-1, JDF-2, and JDF-3 as well as proposed well JDF-5. The model was used to simulate the pressure buildup in the injection zone as a result of a maximum constant rate of 3 MGD for 50 years. The distribution of injection between the four injection wells was modeled as follows. Wells JDF-1 and JDF-5 injected fluid at 0.15 MGD each. Wells JDF-2 and JDF-3 injected fluid at 1.35 MGD each. However, the actual rate of injection for the concentrate will be based on plant operation that will be governed by the availability of surface water, population growth, meeting peak demands, and any disruption in other supplies. The actual amounts of injection will be less than the

bio variation in volumes injected by each well in the model.

constant rate of 3 MGD for 50 years and the area requested for exemption is ultra conservative.

TCEQ Comment: **Page 17 of the application says "The proposed exempt aquifer is under artesian pressure and rose to a height of approximately 500 ft BGL in the injection wells." On page 22 of the application it says "Water levels in the three injection wells were measured in March 2007. The measurements were 3,660 ft in JDF-1, 3,616 ft in JDF-2, and 3,633 ft in JDF-3." These two statements indicate different water levels. Please clarify.**

EPWU Response: The water levels mentioned in the two statements are consistent. The reference on page 17 reflects a measurement of approximately 500 feet below ground level (land surface). The surface elevation in this area is approximately 4,152 feet. If you subtract 500 from 4,152, the artesian level is consistent with those discussed on page 22 of the application. The text of the revised application has been modified for greater clarity.

TCEQ Comment: **Page 23 of the application states that the hydraulic gradient in the Fusselman-Montoya-El Paso Group was determined to be 0.003 foot/foot. Please explain how this number was determined.**

EPWU Response:
Water levels in the three injection wells were measured in March 2007. The measurements were 3,660 feet in JDF-1, 3,616 in JDF-2, and 3,633 in JDF-3. The resulting hydraulic gradient was 0.008 foot/foot in the direction 60 degrees west of south. The impact of the local faulting on the local hydraulic gradient is not known, but the northwest-southeast faulting is expected to have some impact on local water levels and flow directions. The hydraulic gradient measured at the site was used in conjunction with the regional flow patterns as a basis for setting boundary conditions on the north and south ends of the flow model. EPA (1997) documents a southerly regional flow direction in the nearby Hueco-Tularosa aquifer but indicates that flow directions near the injection wells are influenced by complex geology. For the purposes of this modeling, it was assumed that regional groundwater flow was to the south in the injection zone as well. While the local hydraulic flow gradient measured at the site (0.008 foot/foot) was considered in developing the flow model, it was determined that this local gradient did not represent regional conditions. This conclusion was based on two observations. First, the complex nature of the geology and faulting in the area of the wells used to estimate the gradient. This faulting provides significant potential for localized anomalies in hydraulic gradient. Second, the local gradient (0.008 foot/foot) is significantly higher than the hydraulic gradient in the regional Hueco-Tularosa aquifer. EPA (1997) indicates that the southerly gradient in the shallow aquifer is about 0.0015 foot/foot, based on the documented head difference between the Texas-New Mexico border and the Rio Grande River to the south. The measurements indicate that the local gradient calculated from the three wells is significantly higher than the regional gradient of 0.0015 foot/foot. This finding is consistent with *Groundwater* (1979), which documents how topography and hydrogeology can impact regional flow systems. Additionally, Toth (1963) indicates that

deeper units in regional flow systems generally have similar but lower hydraulic gradients than the shallower units in the same system. Therefore, the regional hydraulic gradient for the Fusselman-Montoya-El Paso Group is represented in the model at 0.003 foot/foot, which is higher than the measured regional gradient of 0.0015 but lower than the local gradient of 0.008. This simulated hydraulic gradient is conservative and still indicative of the regional flow in the Hueco-Tularosa system. Based on findings from other regional systems, we feel it is appropriate to use the regional gradient in the injection zone.

The text of the application has been modified for clarification.

TCEQ Comment: **On page 8 of the application it is stated that the exemption meets the criteria of "it cannot now and will not serve as a source of drinking water…" and on page 20 it is indicated that there is a possibility of it serving as a drinking water source later. Please clarify this.**

EPWU Response: EPWU remains firm in its statement that the Fusselman cannot now and will not serve as a source of drinking water. Due to its great depth and poor water quality, use of the aquifer is economically and technically impractical. We have modified page 20 of the application to parallel our statement on page 8.

TCEQ Comment: **Please provide a figure showing the depth of the top of the injection zone throughout the exempted area and make any adjustments in the area extent of the proposed exemption appropriate under the criteria of 30 TAC §331.13 to justify the proposed exemption.**

EPWU Response: EPWU has developed a figure showing the depth to the top of the Fusselman throughout the proposed exempt area and is included as Figure 18. In an effort to be conservative and to assure all of the criteria of 30 TAC §331.13 are met, we have slightly modified the area for the proposed aquifer exemption. The aerial extent of the proposed area of exemption is described on page 7 of the application. Replacement figures for the application are included as an attachment to this correspondence.

TCEQ Comment: **Please clarify what was changed between the present and previous model runs to account for the plume movement change. What was refined in the model?**

EPWU Response: The specific south-southeast direction of flow in the 2008 Aquifer Exemption Application was based on a review of available literature and the test data from the injection site. These data inferred that flow from the injection site would be toward the south/southeast. This included: 1) the structure map for the area, 2) the gravity map for the area (Granillo, 2004), and a thermal map for the area (Witcher, 1997). At the time of the TCEQ review, Mr. David Murray (TCEQ) suggested a gradient toward the southwest, based on water levels in the three wells at the injection site. EPWU was aware of this apparent direction of flow towards the southwest but felt that the geologic

data referenced above indicated there was a strong anisotropy (fabric) toward the south-southeast, and therefore the direction of groundwater flow was more toward the south-southeast. We believe that the local gradient (to the southwest) calculated by the water level in three wells near the site is caused by different water levels in different fault blocks at the injection site. A more regional perspective, however, indicated a south-southeast flow direction.

Mr. Murray also made the observation that the Fusselman Formation outcropped along the east side of the Hueco Mountains (to the southeast of the injection site), and might be a possible area for Fusselman groundwater discharge. Because of the questions raised by TCEQ, EPWU reevaluated the direction of flow in a more regional context. This reinterpretation included a mapping of the Fusselman Formation in the Hueco Mountains (Figure 2, 2008 Revised Aquifer Exemption Application). This provided a more detailed structural map of the Fusselman for the groundwater model. This mapping indicated that the Fusselman in the area of the Hueco Mountains was eroded away and no longer existed. In the geologic past, the area had been uplifted and was now part of an eroded anticlinorium. This lack of Fusselman in the Hueco Mountains creates an area of "no flow" in the southeast part of the groundwater model. When the revised distribution of the Fusselman was input into the MODFLOW groundwater model, the regional direction of groundwater flow shifted. Because of this no flow section of the aquifer, regional groundwater flow in the Fusselman is toward the south, and the local gradient near the injection site is to the southwest, which is consistent with the direction of flow calculated from the measured water levels in the three wells at the injection facility. This southerly direction of both the regional flow and the anticipated injectate plume direction is also consistent with the groundwater flow direction in the overlying Hueco-Tularosa alluvial aquifer, as modeled by the U.S. Geological Survey (Heywood and Yager, 2003).

These figures were provided to TCEQ on June 24, 2010 and clarifications have been made in the revised application.

TCEQ Comment: **What are the flow boundaries and how were they determined?**

EPWU Response: Specific head boundaries at the northern edge (upgradient) of the model and on the southern edge (downgradient) of the model were defined. The specific head on the upgradient and downgradient edges of the model were 3,800 feet (amsl) and 2,900 feet (amsl), respectively. These boundary conditions were selected so that the model would reproduce the observed water level at the site (3,630 feet amsl). The eastern and western edges of the model were considered no-flow boundaries because they are roughly parallel to the regional groundwater flow. In the areas where the Fusselman-Montoya-El Paso Group is not present, only very low permeability rocks are present (King, 1945). Therefore, a no-flow zone was incorporated in those areas because it was assumed that no significant groundwater flow occurred in this area due to the uplift and low permeability rocks.

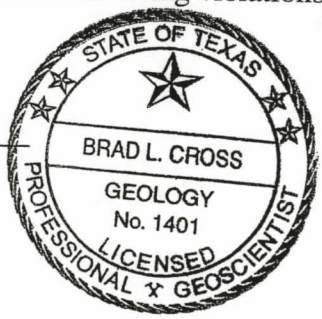
EPWU appreciates the initiative TCEQ has taken in holding discussions with EPA Region 6 on the pending application. Our review of the EPA's modeling checklist indicates that the checklist

is very thorough and is meant to cover a very wide range of hydrogeologic conditions, environments, modeling objectives and scenarios. The checklist serves as a good generic list of issues that should be considered for most models, but it is important to remember that local site conditions and modeling objectives vary dramatically from site to site and therefore, some items on the list become less relevant. In this case, the injection zone is very deep and is not used for water supply; therefore significantly less data and information is available to develop a model when compared to shallower systems that are modeled for regulatory purposes. Therefore, we ask that the TCEQ and EPA consider the site-specific constraints of the local area when considering the generic checklist.

We sincerely appreciate the interest you have shown in this project as well as the dedication of the UIC Team in the review of this application. We request that the proposed area be designated as the exempt area of the aquifer pursuant to El Paso Water Utilities' petition.

I, Brad L. Cross, Associate, certify under penalty of law that this revised documentation was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware there are significant penalties for submitting false information including the possibility of fine and imprisonment for knowing violations.

Brad L. Cross Date 4/5/2011



Attachments
cc: Ben Knape, TCEQ

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U.S. ENVIRONMENTAL PROTECTION AGENCY

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

INTRODUCTION

Background

The Kay Bailey Hutchison Desalination Plant converts brackish water from the Hueco Bolson to potable water for use by the City of El Paso and Fort Bliss. The Hueco Bolson is a major source of water for the El Paso region including the City of El Paso, Fort Bliss, and Ciudad Juárez, Mexico. This underground water resource contains significant quantities of brackish water that had historically been unused. The desalination plant allows a reduction in withdrawals of fresh water from the Hueco Bolson Aquifer and is a critical component of the water supply portfolio for the El Paso area.

Operation of the plant will be consistent with El Paso Water Utilities' (EPWU) conjunctive use of surface water from the Rio Grande and local groundwater. Specifically, during times of "full" river allocation, groundwater pumpage from the Hueco Bolson and operation of the plant will be minimal. Under "drought" conditions, groundwater from the Hueco Bolson and operation of the plant will be maximized to make up for the shortage of surface water. In addition to drought protection, the plant will be used to provide for growth, meet peak demands, and be used if there is a disruption in other supplies.

The plant treats brackish water drawn from the Hueco Bolson, referred to as "feed" water, using reverse osmosis (RO) technology. RO uses semipermeable membranes to remove dissolved solids (primarily salts) from brackish water, producing fresh water. The result is two water streams: fresh water (called "permeate") and a concentrated brine formed from the salt removed from the brackish feed water (called "concentrate"). Permeate has a very low salinity, is very pure and is mixed with brackish "blend" water, also drawn from the Hueco Bolson, prior

to distribution in the public water supply. The blended water is called "finished" water and complies with federal and state drinking water standards.

The Kay Bailey Hutchison Desalination Plant is capable of producing 27.5 million gallons of fresh water daily (MGD). Concentrate disposal from the plant is currently accomplished through three deep injection wells (authorization is for five wells to be drilled), located approximately 22 miles northeast of the plant (Figure 1). EPWU received authorization from the Texas Commission on Environmental Quality (TCEQ) to construct and operate up to five Class V injection wells completed in the Fusselman Dolomite (Silurian age), the Montoya Dolomite (Ordovician age), and the El Paso Group (also of Ordovician age). The Fusselman-Montoya-El Paso Group is considered an underground source of drinking water (USDW) because the Total Dissolved Solids (TDS) of the natural formation water is below 10,000 mg/L.

The current Class V injection well authorization prohibits injecting water that does not meet primary drinking water standards, even if the formation water exceeds the primary drinking water standard for that particular parameter. Native Fusselman-Montoya-El Paso Group water samples demonstrate that the water quality does not meet national and state primary drinking water standards for arsenic, gross alpha (less Ra and U), nitrite, and radium. In addition, the formation water is brackish with a TDS of over 8,000 mg/L.

Under current operations, the chemical composition of the dilute and non-hazardous desalination concentrate (injectate) has a TDS less than 6,000 mg/L. Thus, the concentrate has an overall higher quality than the native Fusselman-Montoya-El Paso Group water. The only parameters of the concentrate that do not meet primary drinking water standards are arsenic and gross alpha (less Ra and U). As noted above, the native Fusselman-Montoya-El Paso Group formation water contains arsenic and gross alpha that already do not meet primary drinking water standards.

Currently, the concentrate is being diluted in order to meet the requirements of authorization (i.e., arsenic and gross alpha concentrations below primary drinking water standards). While the plant is currently generating only 700 gallons per minute (gpm) of concentrate, EPWU recognizes that as water demand increases over the years, the volume of concentrate will also increase, raising the question of how to address the primary drinking water standard issue.

The most viable option in dealing with injecting concentrate that does not meet primary drinking water standards for one or more parameters is an "aquifer exemption." The U.S. Environmental Protection Agency (EPA) and TCEQ can jointly approve an aquifer exemption by finding that this use (injecting concentrate) in a USDW aquifer may be more important than or otherwise take precedence over, the use of the aquifer as a potential source of water supply for human consumption.

Aquifer exemptions require modifications to State Underground Injection Control (UIC) Programs, including public notice and participation. The exemptions are granted by TCEQ with concurrence from the EPA in accordance with 40 CFR Parts 144-146, 30 TAC and Chapter 331. The process includes submittal of an application package to TCEQ for review. Once the TCEQ reviews and tentatively approves an aquifer exemption request, the request is sent to EPA for approval.

EPA has developed a document (GWPB Guidance #34) that provides guidance to EPA Regional Offices on the process for approving modifications in delegated UIC Programs, including aquifer exemptions. Due to the lack of a formal application form, EPWU has elected to provide justification for an exemption utilizing the "Aquifer Exemption Summary Sheet" from EPA's "UIC Guidance #34." As stated in UIC Guidance #34, a distinction is drawn between "Substantial" versus "Non-Substantial" Revisions to UIC Programs. As is developed in this application, and consistent with UIC Guidance #34, the requested revision to the Texas UIC Program would be considered "Non-substantial" because (1) the TDS concentration of the proposed exempt aquifer is substantially greater than 3,000 parts per million, and (2) the formation is deep and remote. The authority for approval of a Non-Substantial revision would be delegated to the Regional Administrator.

Owner/Operator

El Paso Water Utilities
Attn: Scott Reinert, P.E., P.G.
1154 Hawkins Blvd.
El Paso, Texas 79925
sreinert@epwu.org
(915) 594-5579

Agent/Consultant

Brad L. Cross, P.G.
LBG-Guyton Associates
1101 S. Capital of Texas Highway, Suite B-220
Austin, Texas 78746
bcross@lbg-guyton.com
(512) 327-9640

Facility Contact Information

Facility Name: Kay Bailey Hutchison Desalination Plant

Location Description: Injection well facilities are located approximately twenty-two (22) miles northeast of the Kay Bailey Hutchison Desalination Plant and a few miles south of the McGregor Range Camp.

Facility Contact Person: Scott Reinert, P.E., P.G. (915) 594-5579

Class V Injection Well Locations

There are five permitted Class V injection wells (three active and two authorized but not drilled) associated with the proposed aquifer exemption. Although permitted as Class V injection wells, the wells were constructed in compliance with the more stringent casing and cementing requirements of Class I injection wells. The locations of the wells are as follows:

Injection Well	Status	Location (Lat./Long.)
JDF-1	Active	31° 59' 49" N 106° 06' 25" W
JDF-2	Active	31° 58' 24" N 106° 06' 30" W
JDF-3	Active	31° 59' 15" N 106° 06' 43" W
JDF-4	Authorized But Not Drilled	31° 59' 55" N 106° 07' 45" W
JDF-5	Authorized But Not Drilled	31° 59' 13" N 106° 06' 05" W

Aquifer to be Exempted

Formation Name: Fusselman Dolomite (Silurian-age) and the underlying Montoya Dolomite (Ordovician-age) and El Paso Group (Ordovician-age). (A regional stratigraphic column is included as Figure 6.) The Fusselman-Montoya-El Paso Group will collectively be referred to throughout the remainder of this report as the proposed "exempt aquifer."

Fusselman Dolomite - The Fusselman Dolomite consists of a fractured, medium gray to cream color dolomitic limestone. Electric logs (March 2005 Class V Injection Well Application) indicate that the Fusselman is approximately 590 feet thick in the proposed aquifer exemption area.

Montoya Dolomite - The Montoya Dolomite is composed of three members including the Cutter, Aleman, and Upham. The Montoya is characterized by massive beds of dolomite alternating with beds of cherts. Electric logs indicate that the Montoya is approximately 300 feet thick in the proposed aquifer exemption area.

El Paso Group - The El Paso Group consists of a series of medium to dark gray limestones and dolomites. The thickness of the entire El Paso Group in the area of the proposed aquifer exemption is undetermined. Measured thickness of the type section of the El Paso Group in the Franklin Mountains (El Paso) is 1,590 feet. The uppermost 600 feet of the group has been penetrated by the Injection Well No. 1 (JDF-1). In addition to the entire thickness of the Fusselman and Montoya Dolomites, the proposed exemption is for the entire thickness of the El Paso Group rather than the depth of penetration of JDF-1. (Injection Well No. 2 [JDF-2] did not penetrate the El Paso Group and Injection Well No. 3 [JDF-3] penetrated 125 feet of the El Paso Group.)

Subsurface Depth: Electric logs indicate the top of the proposed exempt aquifer ranges in depth from 2,222 to 2,890 feet below ground level (BGL).

Vertical Confinement: The upper confining zone for the proposed exempt aquifer consists of over 1,700 feet of continuous low-permeability shale and limestone. These units range in age from Devonian (Canutillo Formation) to Permian (Hueco Group). Confining strata beneath the lowermost interval is the Bliss Sandstone. The Bliss Sandstone (Lower Ordovician) is approximately 250 feet thick and consists of sandstone, quartzite, and siltstone. The quartzite and sandstone are composed of fine to medium quartz grains cemented by clay and silica, providing a low permeability stratum which prevents downward movement of injected fluids.

Aquifer Thickness: The proposed exempt aquifer has a thickness of approximately 2,480 feet. (The Fusselman Dolomite has a thickness of 590 feet, the Montoya Dolomite has a thickness of 300 feet, and the El Paso Group has a thickness of 1,590 feet.)

Exemption Description

The limits of the requested exempt aquifer are defined vertically as the top of the Fusselman Dolomite to the base of the El Paso Group. The upper vertical limit of the exemption ranges in depth from 2,222 to 2,890 feet BGL. At the injection site, the upper confining zone for the proposed exempt aquifer consists of more than 1,700 feet of interbedded Devonian, Mississippian, Pennsylvanian, and Permian shales and limestones. This sufficient vertical

confinement is maintained throughout the proposed exemption area. Areas of less confinement are recognized outside of the proposed area of exemption.

The lower limit of the requested exempt aquifer is the base of the El Paso Group at depths ranging from 4,702 to 5,370 feet BGL. The confining stratum beneath the lowermost injection interval is the Bliss Sandstone. The Bliss Sandstone is approximately 250 feet thick and consists of sandstone, quartzite, and siltstone. The sandstone and quartzite are composed of fine to medium quartz grains cemented by clay and silica, providing a low permeability stratum which prevents downward movement of injected fluids.

Lower limit of exemption

The horizontal limit of the proposed exempt aquifer is defined by the lateral extent of the simulated plume and represents a concentration reduction factor of 1,000 times from the original injectate. The plume is based on a constant injection of 3 million gallons per day (MGD) over a 50-year injection period. The plume is approximately elliptical in shape with the width of the plume varying from 0.5 to 2 miles and with a length of 17 miles.

In an effort to be conservative, a buffer zone has been added around the simulated plume. The aerial extent of the proposed exempt area is rectangular in shape with the northwest corner of the exemption being located at latitude 32° 00' 13.38" N, longitude -106° 11' 49.28" W; the southwest corner at latitude 31° 43' 30.00" N, longitude -106° 11' 49.28" W; the southeast corner at latitude 31° 43' 30.00" N, longitude -106° 05' 42.12" W; and the northeast corner at latitude 32° 00' 12.74" N, longitude -106° 05' 42.12" W. The total area included in the proposed exemption (simulated plume plus rectangular buffer zone) is approximately 115 square miles and is located in El Paso County, Texas (Figure 1).

It is clear from geologic, gravity, and magnetic data that the aquifer is laterally extensive and correlative across the Area of Review. A map showing the proposed exempt area is included as Figure 2.

Justification for Exemption

Aquifer exemptions may be granted under EPA 40 CFR §146.4 and TCEQ 30 TAC 331.13, if:

(X) Aquifer is not a source of drinking water and will not serve as a source of drinking water in the future because it:

(X) Has a TDS level above 3,000 mg/L and less than 10,000 mg/L and is not reasonably expected to supply a public water system

( ) Is producing or capable to produce hydrocarbon

( ) Is producing or capable to produce minerals

(X) Is too deep or too remote which makes recovery of water for drinking water purposes economically or technically impractical

( ) Is above Class III area subject to subsidence

( ) Is too contaminated

EPWU respectfully requests an aquifer exemption because the formation meets the following criteria:

1. *40 CFR §146.4 Criteria for Exempted Aquifers*

"An aquifer or a portion thereof which meets the criteria for an 'underground source of drinking water' may be determined under 40 CFR 144.8 to be an 'exempted aquifer' if it meets the following criteria:

(a) It does not currently serve as a source for drinking water;

There are no drinking water wells, public or private, producing water from the proposed exempt aquifer. A search of State public water supply databases (TCEQ Public Drinking Water Section and NMED Drinking Water Bureau) has revealed that there are no public water supply systems utilizing the aquifer as a source of drinking water in Texas or New Mexico.

A search of water well records (drillers' logs), public sources of data, and an on-the-ground site survey in the area indicates that the aquifer has not been nor is currently utilized as a domestic, agriculture, or industrial supply of water. Furthermore, the aquifer is an oil producing

formation in West Texas and Southern New Mexico and is also used as an injection zone for disposal of oilfield brine.

2. *§146.4(b)(2) It cannot now and will not serve as a source of drinking water because: It is situated at a depth or location which makes recovery of the water for drinking water purposes economically or technologically impractical.*

The depth of the proposed exempt aquifer ranges from 2,222 to 2,890 feet. Use of the aquifer as a water resource is economically and technically impractical. Water from the proposed exempt aquifer would require treatment before use as a water resource even if injection of concentrate were not occurring. Brine concentrate would be generated during the treatment process which require disposal.

Alternative sources of drinking water (Rio Grande, Hueco Bolson, Mesilla Bolson, Capitan Reef Aquifer, Antelope Valley, Wildhorse Ranch, and Dell City) are available. These alternative sources have a higher quality and can be produced at a significantly lower cost.

Additional detail on the economic analysis is provided in the "Economic Evaluation of Alternative Water Supply Sources" section of this application.

Oil or Mineral Production History

There is no oil or mineral production history associated with the proposed exempt aquifer in the El Paso area. However, the aquifer is an oil-producing formation elsewhere in West Texas and Southeast New Mexico (Figure 3) and is also used as an injection zone for disposal of oilfield brine.

Active Injection Wells Injecting into Same Formation

Other than the three existing and two authorized/proposed EPWU Class V injection wells associated with the desalination facility, there are no injection wells completed in the proposed exempt aquifer.

Water Use in Area

The proposed exempt aquifer does not serve as a source of drinking water and there are no water supply wells that penetrate the aquifer in this area. To evaluate the production and use of groundwater from the aquifer, an on-the-ground site survey as well as a literature review and file search of the Texas Water Development Board (TWDB), TCEQ, Railroad Commission of Texas (RCC), New Mexico Environment Department (NMED), and New Mexico Energy, Minerals, and Natural Resources Department (NMEMNRD) was conducted to support the permit application.

Exceeding the suggestions in EPA UIC Guidance #34, the simulated plume area and a buffer zone was surveyed to identify any artificial penetrations (public water supply wells, domestic water wells, industrial water wells, agricultural water wells, injection wells, oil and gas wells, test holes, exploratory holes, abandoned wells, etc.). The search revealed that there are no water supply wells that penetrate the proposed exempt aquifer.

AOR findings

Eighty-seven (87) artificial penetrations were identified in the search; however, the artificial penetrations are relatively shallow, do not penetrate the aquifer or confining zone, and no corrective action is necessary. Thirteen narrow-diameter test holes (GT-1 through 12 and 14) were drilled in 1980 as part of a study to measure temperature gradients in the local area. Eleven of the holes are only 164 feet deep. Of the other two, Well GT-11 penetrated only a few feet into the confining zone, while Well GT-12 penetrated approximately 550 feet into the confining zone. All 13 wells were abandoned and attempts to locate them were unsuccessful. Because of the small diameter of these test holes and the length of time since their abandonment (30 years), it is reasonable to assume that these penetrations have sealed over time and are not causes for concern. Only two of the test holes (GT-6 and GT-12) are located within the Area of Review.

APs into confining zone thought to be sealed since Top confining layer is 1700, 1700-5[illegible] 11[illegible] interval

During the exploration and development phase of Kay Bailey Hutchison Desalination Plant design, the US Army Corps of Engineers (COE) drilled four test holes in the area to collect data that was used in evaluating the suitability of the site for injection wells. Only COE test holes TH-1 and TH-3 and the EPWU injection wells penetrate the injection zone. A tabulation of data on all artificial penetrations in the Area of Review is provided as Table 1. Artificial penetrations in Table 1 are identified with map identification numbers that are keyed to the

2 test wells & 3 inj wells enter the interval

topographic map (Figure 4). Well records available from various state agencies are provided in Appendix E.

State Agency Coordination

As part of the original application process for the authorization of the Class V injection wells and the current aquifer exemption request, coordination meetings were held with staff of the TCEQ, NMED, and EPA. The purpose of these meetings was to inform agency staff of current project status and to receive input on how to best address injecting water that does not meet primary drinking water standards even if the formation water is already above the primary standards for a particular parameter. A timeline summarizing coordination meetings as well as other project activities is included as Appendix A.

It was originally thought that a small portion of the area of exemption would extend into the State of New Mexico (Fort Bliss property) and an aquifer exemption application package was submitted to NMED. However, based on refined modeling, the plume will not migrate into New Mexico and a request for withdrawal of the original application will be submitted to NMED. -What was NMED's finding?

3/22/12
Called Brad Cross LBG
512-327-9640
Asked him to provide some sort of
language from NM that indicates
they are OK with the exemption.
Also asked him to provide an
analysis of the expected concentrations
at the point of injection.

Raya Copy

EXEMPT AQUIFER DESCRIPTION

Stratigraphy

Figure 5 is a geologic map of the area and Figure 6 is a regional stratigraphic column showing the geologic and hydrologic units in the area. The proposed aquifer exemption is located in the southeastern Basin and Range province, defined by topographically high mountain ranges and plateaus separated by adjacent down-faulted basins (bolsons). Geologic units in the area range from Precambrian to Recent. Precambrian, Paleozoic, and Tertiary igneous strata primarily outcrop in mountainous areas, Cretaceous and Permian strata outcrop in plateaus, and Tertiary and Quaternary strata are found in the bolson areas.

The oldest outcropping unit in the El Paso area is the Precambrian *Castner Formation* that was deposited as a marine offshore siliceous and carbonate mud. These sediments were lithified into alternating strata of limestones, siltstones, and shales which were later metamorphosed into marbles and hornfels. The Castner is exposed in a number of places along the eastern slopes of the Franklin Mountains (23 miles west of the proposed aquifer exemption area) and is about 1,112 feet thick. Exposures of the Castner are limited due to burial by younger unconsolidated sediments and by granitic intrusions.

Overlying the Castner Formation is a thin submarine basalt flow known as the *Mundy Breccia*. The Mundy is, in turn, overlain by a thick sequence of quartz sands that have been metamorphosed to the *Lanoria Quartzite*. The Lanoria Quartzite has similar features to those seen in modern beach systems such as the Texas Gulf Coast. A section about 2,600 feet thick can be observed in the nearby Franklin Mountains. The capping stratigraphic unit of the Lanoria is a 1,100-foot thick series of igneous intrusions. The molten rock intruded into the Castner, Mundy, and Lanoria Formations and on occasion some of the magma breached the surface to initiate a series of volcanic eruptions. These eruptions included pyroclastic ash-flow tuffs as well as numerous lava flows.

A quiet period followed and erosion of the igneous rocks began. The erosion continued until about 500 million years ago when a rising sea level gradually flooded the El Paso-Juárez region. Marine sediments that were deposited over the erosional surface were a sandy material that was lithified to form the lower Ordovician-age *Bliss Sandstone*. For the next 250 million

1 Igneous rocks below the Bliss Sandstone which is identified as the lower confining layer

2

years, the area was part of the continental shelf, a low-lying region very close to sea level that was often inundated by the sea.

Equatorial to tropical marine carbonates (limestones and dolomites) of the *El Paso Group* (Lower Ordovician) were deposited and are exposed along the east flank of the Franklin Mountains. The El Paso Group is overlain by the Upper Ordovician *Montoya Dolomite*. The formation is divided into three members (Cutter, Aleman, and Upham) and is characterized by massive beds of medium to dark gray dolomite alternating with beds of chert.

The overlying Silurian *Fusselman Dolomite* is a massive, magnesium-rich, white to gray, sugary dolomite that is approximately 640 feet thick at its type section in the Franklin Mountains and 590 feet thick in the proposed aquifer exemption area. The Fusselman is an oil-producing formation elsewhere in West Texas and Southern New Mexico and is also used as an injection zone for disposal of oilfield brine.

Overlying the Fusselman is the *Canutillo Formation* (Middle Devonian) which is unconformably separated from the overlying *Percha Shale* (Upper Devonian). The Canutillo Formation is a dark color shale containing a dense basal limestone. Approximately 175 feet of the Canutillo Formation can be found at the type locality in the Franklin Mountains and 155 feet of correlative beds in the Hueco Mountains (east of the proposed aquifer exemption). The overlying Percha Shale is 99 feet thick in the Franklin Mountains and 100 feet thick in the Hueco Mountains. It is a black, non-fossiliferous shale with local green shale lenses.

The Middle to Upper Mississippian *Las Cruces Limestone*, *Rancheria Formation, and Helms Shale* overlie the Devonian units. The Las Cruces Limestone consists of hard, dense, black limestone beds. The Rancheria Formation is a sequence of cherty, black, bituminous, argillaceous limestone beds that unconformably rests on the Las Cruces. The uppermost Helms Shale is characterized by shale units with minor carbonate units in the upper part.

The Pennsylvanian *Magdalena Group* overlies the Mississippian Helms Shale and is primarily composed of cliff-forming carbonates, shales, and siltstones in the nearby Franklin Mountains. Thick marine carbonates of the *Hueco Group* overlie the Magdalena Group. This Permian-age section has an upper, middle, and lower member and contains over 2,300 feet of light to dark gray limestone and shale.

At the end of the Paleozoic Era, the area was uplifted and occupied this position for most of the Mesozoic Era. During the Cretaceous, the El Paso area was near the head of an arm of the Chihuahuan Embayment, where shallow marine sediments were once again locally deposited. The Cretaceous is present in minor amounts in the Franklin Mountains, underlying the Hueco Bolson, and the Hueco Mountains (400 feet thick). Regionally, the Cretaceous is over 3,000 feet in the nearby Sierra de Juárez and Cerro Cristo Rey (both to the southwest of the project area in Mexico).

The Cenozoic Era was a time of major change in this region. Mountain building forces were in action some 45 to 50 million years ago when bodies of molten magma moved into the crust. None broke through the surface but rather cooled in the crust and are seen today as various plutons throughout the area. Shortly before emplacement occurred, compressive force developed to the southwest and as a result, great masses of Cretaceous limestone were thrust from the southwest to the northeast, forming the Sierra de Juárez.

In time, mountain-building forces waned and the region was geologically quiet until about 29 million years ago when a new system of stresses began. Major geologic features in the area formed in response to the Rio Grande rift, a fault bounded structural feature with uplifted blocks on the east/southeast and west/southwest. The rift begins near Leadville, Colorado and extends southerly through New Mexico to El Paso and then on into Mexico where it appears to die out. A product of the rifting includes the Hueco Bolson, the Hueco Mountains (to the east), the Franklin Mountains (to the west), and the Mesilla Bolson (to the west). Basin fill was derived from erosion of rocks from flanking highlands, the ancestral Rio Grande, and desert sand blown into the area from the southwest.

Hueco Bolson sediments are divisible into the *Fort Hancock Formation* and overlying *Camp Rice Formation.* The Fort Hancock Formation is a lacustrine-type deposit consisting of clays and silts in the south and east regions of the Hueco Bolson. The Camp Rice Formation consists of fluvial deposits of variable sized sands and silts located in the western Hueco Bolson.

The bolson deposits consist of alternating beds of clay, silt, sand, and gravel. The individual beds have a non-uniform character and range in thickness from inches up to about 100 feet. Because of the lenticular nature of the strata, it is difficult to correlate individual beds, even over relatively short distances. Although no wells have penetrated the entire thickness of the

bolson in its westerly extent, recent seismic studies suggest that the maximum thickness of the bolson fill, which occurs within a deep structural trough paralleling the east side of the Franklin Mountains, is about 10,000 feet (Ruiz, 2004). Bolson thickness and sediment grain size generally decrease in an easterly direction across the basin. This corresponds to the change from Camp Rice (fluvial) to Fort Hancock (lacustrine) deposits.

from a stream from a lake

Structural Geology

Digital Elevation Models (DEMs), aerial photographs, along with geologic, gravity, and magnetic data provided the building blocks to interpret the geologic structures at the proposed aquifer exemption site. Four geothermal exploratory slimholes drilled on the Meyer Range, approximately three to five miles northwest of the injection site, also provided information on the stratigraphy and structure of the area. Four slimholes were drilled and cored in 1996 and 1997 to evaluate a potential geothermal source of power generation in this area with a secondary objective of assessing the potential for direct use applications such as space heating or water desalination.

After evaluation of the available data, the Army Corps of Engineers (COE) drilled four test holes in 2003 at the injection site. EPWU also constructed one Class V injection well in 2004 and two Class V injection wells in 2006. These test holes and injection wells provided additional information on the lithology, porosity and permeability, groundwater geochemistry, and geologic characteristics of the area.

The University of Texas at El Paso, Department of Geological Sciences conducted a gravity survey in the area. Six geologic cross-sections (Bouguer Profiles) of the area were generated from a Bouguer Anomaly Map (Granillo, 2004) and are included as Figures 7, 8 and 9. Gravity anomaly maps depict the difference between theoretical computed gravity values and observed gravity values for a region of the earth's crust. Using isolines (lines of equal value) representing gravity (isogals), the gravity contours are overlaid on bedrock geology base maps, providing an interpretation of the regional subsurface geology. During construction of the gravity profiles (cross-sections) for the area, the gravity data was tied to EPWU injection well test hole data to assure quality interpretation of the subsurface.

A geologic structure map on top of the Fusselman has also been constructed. The structure map is based on data from the Class V injection wells as well as five cross-sections from Hawley (2007) and four cross-sections from King (1945). A regional west-east cross-section from the West Texas Geological Survey has also been included. These cross-sections were then used for the development of the Fusselman structure map and also incorporated into the numerical model. The cross-sections are included as Figures 10 through 16 and the structure map with cross-section locations is included as Figure 17. Furthermore, a depth to the top of the Fusselman has also been constructed and is included as Figure 18.

The geologic framework of the El Paso area, which lies within the Basin and Range Province, is primarily controlled by the Rio Grande Rift which results in a series of grabens, or down-dropped basins. The Late Cenozoic basin and range faulting of the region probably initiated about Late Miocene (29 million years ago).

The bounding faults of the Franklin Mountains, located to the west of the proposed aquifer exemption, indicate a downward displacement of 10,000 feet on either side of the range. Displacements on faults that bound the Diablo Plateau, located east of the proposed aquifer exemption, form an escarpment of more than 400 feet.

Basins in the region formed by normal block faulting include the Hueco Basin and its northern extension, the Tularosa Basin, as well as the Mesilla Basin (located west of the Franklin Mountains and some 30 miles west of the proposed aquifer exemption). These block-faulted grabens are asymmetrical due to downward displacement being greater on one side of the basin than the other.

Hydrogeology

Injection wells associated with the proposed aquifer exemption encountered no groundwater of measurable quantity in the upper 453 feet of alluvial fill, and only occasional minor amounts of groundwater were observed in widely separated thin lenses of bedrock at the injection site. This is due to the wells being located in a transitional area known as the McGregor wedge. Geologically, this wedge is a Mesozoic-Paleozoic platform that forms the east rim of the Hueco basin and the western margin of the Hueco Mountains. Erosion and

weathering from the Hueco Mountains have provided the alluvial fill that is present at the injection site.

The principal sources of groundwater within the region are the Hueco Bolson aquifer, the Mesilla Bolson aquifer, and the Rio Grande Alluvium aquifer (all located to the west and south of the injection site).

Underground Sources of Drinking Water (USDW)

Groundwater of measurable quantity is not encountered at the injection site until the proposed exempt aquifer is reached at depths ranging from 2,222 to 2,890 feet. The proposed exempt aquifer is under artesian pressure and rose to a height of approximately 500 feet BGL (app. 3,652 feet [artesian elevation]) in the injection wells. Sample analyses of the aquifer are included in Table 2. The water quality does not meet national and state primary drinking water standards for arsenic, gross alpha (less Ra and U), nitrite, and radium. In addition, the formation water is brackish with TDS of over 8,000 mg/L.

Upper and Lower Confining Zones

The upper confining zone for the proposed exempt aquifer consists of more than 1,700 feet of interbedded Devonian, Mississippian, Pennsylvanian, and Permian shales and limestones. As shown on electric logs (Class V Injection Well Application), the top of the confining zone is at a depth of 453 feet BGL with the base at depths ranging from 2,222 to 2,890 feet BGL. The confining zone provides extremely low permeability strata that prevent upward movement of injected fluids. This sufficient vertical confinement is maintained throughout the proposed exemption area. Areas of less confinement are recognized outside of the proposed area of exemption. The relative position of the upper and lower confining zones are depicted as Post-Fusselman and Pre-Fusselman on the gravity profiles (Figures 7 through 9) and on geologic cross-sections (Figures 10 through 16).

Core data for the confining zone were not available. However, lithology logs were prepared during the drilling and completion of the EPWU injection wells and the entire confining

unit is well described. Analysis of 32 feet of core extracted from the Percha Shale unit of the confining zone indicates that the hydraulic conductivity within this zone is 2.7E-6 feet/day. (A copy of the complete analyses can be found in Appendix V.B.3(b)-1 of Class V Injection Well Application.)

confining layer has low vertical permeabil

Additionally, analysis, processing and interpretation of the Fullbore Formation Imager log were performed by Schlumberger Oilfield Services on injection wells JDF-1, JDF-2, and JDF-3. Work included image porosity analysis, fracture identification and classification, and specifically, identifying vertical fluid barriers above 2,314 feet. Analysis indicates that a good barrier is present from 2,071 feet to 2,094 feet; a very good barrier from 2,046 feet to 2,071 feet; a fair barrier from 1,921 feet to 2,046 feet; and a weak barrier from 1,799 feet to 1,921 feet. (All of the barrier depth intervals are measured from Kelly Bushing.) A description of the Schlumberger analysis is included in Appendix V.B.3(b)-2 of the Class V Injection Well Application.

The confining stratum beneath the lowermost injection interval is the Bliss Sandstone. The Bliss Sandstone is approximately 250 feet thick and consists of sandstone, quartzite, and siltstone. The sandstone and quartzite are composed of fine to medium quartz grains cemented by clay and silica, providing a low permeability stratum which prevents downward movement of injected fluids.

Aquifer Thickness

The proposed exempt aquifer is approximately 2,480 feet thick (The Fusselman is 590 feet thick, the Montoya is 300 feet thick, and the El Paso Group is 1,590 feet thick).

Injection Interval

The injection intervals in the EPWU injection wells were determined from both core analysis and a differential temperature survey. The top of the injection interval is the top of the Fusselman Formation and the base of the injection interval is the base of the El Paso Group.

Groundwater Flow

Static water level data in the injection wells supports a south to southwesterly flow direction (EPA, 1997). Groundwater movement to the south can also be interpreted by temperature gradient studies performed by Taylor (1981) and Witcher (1997). Groundwater flow in the Hueco Bolson and Diablo Plateau generally follows the elevation change of the overlying topography. In general, Hueco Bolson groundwater flow in Texas is from north to south toward the Rio Grande, except where it is diverted toward areas of significant municipal pumping. Diablo Plateau groundwater generally moves in a southerly and easterly direction discharging in the Dell Valley/Salt Flats area.

Aquifer Properties

Table 3 provides a compilation of aquifer properties for the proposed exempt aquifer. The proposed exempt aquifer has a thickness of approximately 2,480 feet and consists primarily of dolomitic limestones and alternating beds of chert. Geophysical logs indicate the top of the aquifer ranges from 2,222 to 2,890 feet BGL in the proposed aquifer exemption area. A conventional core recovered from 2,306 feet to 2,315 feet BGL in injection well JDF-1 has porosities ranging from 1.4% to 13.2% with an average porosity of 6.3%. Hydraulic conductivity of the aquifer is 7.02E-04 ft/sec and was determined from aquifer tests involving JDF-1, JDF-2, and JDF-3. Temperature was determined from initial well testing on JDF-1 and range from 155.45°F at 2,315 feet to 161.81°F at 3,765 feet. Density was measured at 1.0052 g/cm^3 in JDF-1. A viscosity value of 0.397 cp was calculated from a fluids property input module in the PanSystem2 analysis software (Van Wingen, 1950). An aquifer static pressure was measured in JDF-1 at 786.82 psia at 2,303 feet.

Aquifer Water Quality

The groundwater quality in the proposed exempt aquifer was sampled in each of the three constructed Class V injection wells and contains water that does not meet primary water quality standards for arsenic, gross alpha (less Ra and U), nitrite, and radium. TDS in injection well JDF-1 was measured at 8,260 mg/L, injection well JDF-2 was measured at 8,640 mg/L, and

injection well JDF-3 was measured at 8,780 mg/L. A summary of the sample analyses for the proposed exempt aquifer is included in Table 2. Complete analyses are included in Appendix B. (A copy of the laboratory analysis for the current non-dilute concentrate is included in Appendix C.)

The arsenic standard was not met in one of the three samples collected (10.6 ug/L *vs.* a standard of 10 ug/L). The Gross Alpha standard was not met in any of the three samples (412, 620, and 774 pCi/L *vs.* a standard of 15 pCi/L). The nitrite standard was not met in one of the samples (1.14 mg/L *vs.* a standard of 1 mg/L). The radium standard (Ra-226+Ra-228) was not met in both samples collected (15 and 19 pCi/L *vs.* a standard of 5 pCi/L).

As indicated above, the aquifer is not utilized as a municipal, domestic, agricultural, or industrial source of water. Due to its great depth and poor water quality, use of the water resource is economically and technically impractical.

RESERVOIR MODELING

A groundwater flow and transport model was developed to estimate the pressure increase and extent of the non-hazardous injectate front resulting from the injection of concentrate into four wells at a combined rate of 3 MGD for a 50-year period. Actual plant operation is expected to inject concentrate at a rate less than 3 MGD. As discussed in the Introduction of this report, operation of the desalination plant will be consistent with EPWU's conjunctive use of surface water from the Rio Grande and local groundwater. Specifically, during times of "full" river allocation, groundwater pumpage from the Hueco Bolson and operation of the plant will be minimal. Under "drought" conditions, groundwater from the Hueco Bolson and operation of the plant will be maximized to make up for the shortage of surface water. In addition to drought protection, the plant will be used to provide for growth, meet peak demands, and be used if there is a disruption in other supplies. As such, the areal extent of the plume presented in the modeling section is considered a worse case scenario.

The regional hydrogeology, hydrostratigraphic structure and borehole information discussed in previous sections was used as the basis for developing the conceptual model for the reservoir model. Hydraulic conductivity estimates from pumping tests were incorporated into the model and observed water level measurements in the injection wells were used to simulate aquifer flow and help calibrate the flow model. The flow and transport model was then used to estimate the area of exemption by simulating the transport of the injectate over a 50-year period.

Conceptual Model

The conceptual model and structural information for the groundwater flow and transport model was based on the regional hydrogeology and the detailed site-specific hydrogeologic information obtained from investigations of the injection area. The aquifer thickness (2,480 feet) was based on the hydrogeologic assessments near the injection facility and the geologic descriptions and geophysical logs obtained from the injection well boreholes.

The hydraulic properties in the model were based on analytical results from pressure tests performed in the injection zone. The table below summarizes the results of the pumping tests in the injection wells. Well tests were completed in JDF-2 and JDF-3 and water level

measurements were collected in other wells. The analysis of the data from each pumping test is described (leftmost column) by the well that the pumping occurred in and the well that was used to monitor the pressure change. The transmissivity and storativity estimates were calculated from two different analytical methods (Jacob and Theis) for each well pair. Because the water is relatively fresh (i.e., low total dissolved solids), the hydraulic conductivity was calculated assuming standard viscosity and density of water. To calculate the hydraulic conductivity, the thickness of the open-hole interval in the wells was assumed to be 600 feet, which is the thickness of the Fusselman. This thickness is less than the entire aquifer zone (2,480 feet). The geometric mean hydraulic conductivity estimated from the pumping tests (shown on the last row of the table) was incorporated into the model. The use of the geometric mean implies that the distribution of hydraulic conductivity in the aquifer is log-normally distributed, and the flow is essentially two-dimensional (de Marsily, 1986).

Well Test	Transmissivity (ft^2/day)	Storativity	Method	Transmissivity (ft^2/sec)	Hydraulic Conductivity (ft/sec)
JDF2_1obs	34,300	1.39E-04	Theis	0.397	6.62E-04
JDF2_1obs	41,600	3.80E-05	Jacob	0.481	8.02E-04
JDF3_1obs	35,700	2.86E-05	Theis	0.413	6.89E-04
JDF3_1obs	29,000	2.90E-05	Jacob	0.336	5.59E-04
JDF3_2obs	30,700	9.50E-06	Theis	0.355	5.92E-04
JDF3_2obs	35,200	3.16E-06	Jacob	0.407	6.79E-04
JDF2_3obs	43,400	1.78E-05	Theis	0.502	8.37E-04
JDF2_3obs	44,400	1.27E-05	Jacob	0.514	8.56E-04
Geometric Mean	**36,392**	**2.04E-05**		**0.421**	**7.02E-04**

The aquifer fluid and the injectate were very similar with respect to concentration of total dissolved solids. For this reason, it was assumed that small variations in fluid density, viscosity and temperature were insignificant in determining the flow and transport of the injectate in the aquifer and therefore not considered in the reservoir modeling. The porosity value in the model was 0.063, which was the estimate from the JDF-1.

Water levels in the three injection wells were measured in March 2007. The measurements were 3,660 feet in JDF-1, 3,616 in JDF-2, and 3,633 in JDF-3. The resulting

hydraulic gradient was 0.008 foot/foot in the direction 60 degrees west of south. The impact of the local faulting on the local hydraulic gradient is not known, but the northwest-southeast faulting is expected to have some impact on local water levels and flow directions. The hydraulic gradient measured at the site was used in conjunction with the regional flow patterns as a basis for setting boundary conditions on the north and south ends of the flow model. EPA (1997) documents a southerly regional flow direction in the nearby Hueco-Tularosa aquifer but indicates that flow directions near the injection wells are influenced by complex geology. For the purposes of this modeling, it was assumed that regional groundwater flow was to the south in the injection zone as well. While the local hydraulic flow gradient measured at the site (0.008 foot/foot) was considered in developing the flow model, it was determined that this local gradient did not represent regional conditions. This conclusion was based on two observations. First, the complex nature of the geology and faulting in the area of the wells used to estimate the gradient. This faulting provides significant potential for localized anomalies in hydraulic gradient. Second, the local gradient (0.008 foot/foot) is significantly higher than the hydraulic gradient in the regional Hueco-Tularosa aquifer. EPA (1997) indicates that the southerly gradient in the shallow aquifer is about 0.0015 foot/foot, based on the documented head difference between the Texas-New Mexico border and the Rio Grande River to the south. The measurements indicate that the local gradient calculated from the three wells is significantly higher than the regional gradient of 0.0015 foot/foot. This finding is consistent with *Groundwater* (1979), which documents how topography and hydrogeology can impact regional flow systems. Additionally, Toth (1963) indicates that deeper units in regional flow systems generally have similar but lower hydraulic gradients than the shallower units in the same system. Therefore, the regional hydraulic gradient for the Fusselman-Montoya-El Paso Group is represented in the model at 0.003 foot/foot, which is higher than the measured regional gradient of 0.0015 but lower than the local gradient of 0.008. This simulated hydraulic gradient is conservative and still indicative of the regional flow in the Hueco-Tularosa system. Based on findings from other regional systems, we feel it is appropriate to use the regional gradient in the injection zone.

Model Description

The USGS groundwater flow code MODFLOW-2000 (Hill and others, 2000) was used to simulate pressure response in the injection zone. MODFLOW is a computer program that simulates three-dimensional ground-water flow through a porous medium by using a finite-difference method.

The MT3DMS code (Zheng and Wang, 1999) was used to simulate movement of the transport of the injectate over the 50-year injection periods. MT3DMS is designed for use with any block-centered finite-difference flow model, such as MODFLOW-2000, under the assumption of constant fluid density and full saturation.

MODFLOW-2000 and MT3DMS were selected for the modeling because both codes are well documented and publicly available. Based on aquifer and fluid testing in the injection zone, it can be assumed that fluid density and temperature are relatively constant in the injection zone and transport domain. In addition, the flow system and boundary conditions are relatively simple and the injectate is assumed to be a non-reactive fluid that does not degrade or adsorb.

Model Development and Calibration

The model grid is shown in Figure 19. The single layer MODFLOW finite-difference grid consisted of 895 rows and 552 columns, for a total of 494,040 cells. The grid was refined in the transport domain with a spacing 200 x 200 feet and the grid spacing was 1,000 x 1,000 feet for all other cells. The grid was oriented parallel to the direction of regional groundwater flow, which is approximately from the north to the south. The dimension of the model parallel to flow is 280,000 feet (53 miles) by 150,000 feet (28 miles) perpendicular to flow.

The thickness of the single model layer was 2,480 feet. The estimated elevation of the top of the Fusselman-Montoya-El Paso Group was used as the top elevation of the model layer wherever the Fusselman-Montoya-El Paso Group exists. However, as discussed in the structural geology section and shown in Figure 17, the Fusselman-Montoya-El Paso Group is not present in the vicinity of the Hueco Mountains. In the areas where the Fusselman-Montoya-El Paso Group is not present, only lower permeability rocks are present (King, 1945). Therefore, a no-flow

zone was incorporated in those areas because it was assumed that no significant groundwater flow occurred in this area due to the uplift and low permeability rocks as shown in Figure 19.

The injection zone was assumed to be a homogeneous and isotropic porous media with a hydraulic conductivity of 7.02E-04 ft/sec, and a porosity of 0.063. The aquifer fluid was assumed to constant temperature and density, and the same as the injectate. These assumptions were based on data that demonstrate that the groundwater quality of the injected concentrate is very similar to the natural formation water in the aquifer (in terms of TDS). The longitudinal and transverse dispersivity were assumed to be 250 and 25 feet, respectively. These values are within the range of estimated dispersivity values reported by Gelhar et.al. (1992) for large, field-scale studies. Table 3 contains a summary of model input values.

The regional hydraulic gradient of 0.003 foot/foot was implemented in the model by incorporating the following flow boundaries within the model domain. Specified head boundaries at northern edge (upgradient) of the model and on the southern edge (downgradient) of the model were defined. The specified head on the upgradient and downgradient edges of the model were 3,800 feet (amsl) and 2,900 feet (amsl), respectively. These boundary conditions were selected so that the model would reproduce the observed water level at the site (3,630 feet amsl). The eastern and western edges of the model were considered no-flow boundaries because they are roughly parallel to the regional groundwater flow.

The model was used to simulate steady-state pressure conditions in the injection zone. Figure 20 shows the contours of the pressure head in the aquifer as simulated by the model under steady-state conditions prior to injection. The potentiometric surface indicates that flow from the injection site is south-southwest due in part to the influence of the structural high of the Fusselman-Montoya-El Paso Group associated with Hueco Mountains. The uplift causes the groundwater moving into the model area from the north to flow either to the east or west around the relatively impermeable uplifted section. As discussed above, EPA (1997) documents a similar groundwater flow pattern in the Hueco-Tularosa aquifer.

The model was used to simulate the pressure buildup in the injection zone as a result of a maximum constant rate of 3 MGD for 50 years. The distribution of injection between the four planned injection wells was modeled as follows. Wells JDF-1 and JDF-5 injected fluid at 0.15 MGD each. Wells JDF-2 and JDF-3 injected fluid at 1.35 MGD each.

However, the actual rate of injection for the concentrate will be based on plant operation that will be governed by the availability of surface water, population growth, meeting peak demands, and any disruption in other supplies. It is anticipated that the actual amounts of injection will be, on the average, less than the constant rate of 3 MGD for 50 years. A steady-state simulation was completed to calculate the pressure increase. A steady-state scenario was simulated because it is considered to be the most conservative estimate as it provides the largest pressure increase and area of influence.

Figure 21 shows the steady-state pressure increase in the aquifer throughout the model area when 3 MGD is injected. The contours of pressure increase are in units of feet of water head. The model indicates that the pressure increase is less than 1.5 feet at distances greater than about a one mile from the injection wells. The pressure increase is relatively small because of the relatively high hydraulic conductivity of the aquifer. The model gridblocks are 200 x 200 feet at the injection wells and therefore the model is not appropriate for simulating well hydraulics or pressure buildup in the wellbore.

Extent of Plume

The extent of the plume was simulated by assuming constant injection at 3 MGD of injectate. The injectate was assumed to have a concentration of 1 mg/L, and the natural formation was assumed to have a concentration of 0 mg/l. Therefore, the model results can be depicted as relative concentration contours. The relative concentration (C/Co) is the calculated model concentration (C) divided by the initial concentration of the injectate. The full strength injectate has a C/Co value of 1.0. As an example, the relative concentration of 0.001 in the aquifer represents a concentration reduction factor of 1,000 times from the original injectate. Thus, the relative concentration can be used to determine the actual concentration of constituents if the injectate concentration is known. Another way to think about the relative concentration is that it represents the fraction (ranging from 0.0 to 1.0) of the original injectate that is present at a given location in the aquifer. Therefore, a relative concentration of 1.0 indicates that the water in the aquifer consists of 100% injectate. A relative concentration of 0.001 indicates that the water in the aquifer consists of 0.1% injectate.

Lateral Extent of Plume

The MT3DMS code was used to simulate the movement of the injectate for 50 years with a constant injection of 3 MGD. The extent of the plume after 10, 30, and 50 years are shown in Figures 22, 23 and 24, respectively. The figures show the migration of the plume throughout the 50-year injection period. Each figure shows the extent of the plume as represented by the relative concentration contours of 0.5, 0.1, 0.01 and 0.001. The relative concentrations are small because of the high volume of aquifer water that moves through the aquifer, resulting in a significant dilution and dispersion of the injectate in the aquifer. Because of the high dilution and dispersion, the role of molecular diffusion over the 50-year injection period is considered insignificant. Figure 24 shows that the proposed exempt area is consistent with the 0.001 relative concentration contour after 50 years.

To calculate the area of aquifer to exempt, a two–mile buffer was added to the extent of the injectate plume after 50 years as defined by the 0.001 relative concentration contour. A 50-

year projection for the injectate is included in Table 2. The proposed exempt area of the aquifer is shown in Figure 2.

Assessment of Vertical Plume Movement

Figure 25 schematically illustrates the vertical cross-section near the injection facility. As shown in the figure, there is approximately 1,700 feet of confining shale and limestone above the injection zone. Vertical migration of injectate was modeled through the confining units by calculating a conservative advective velocity through the overlying units based on the pressure increase during injection. The pressure increase was estimated by calculating the maximum pressure increase near the injection facility as simulated in the model. The model indicates that the maximum pressure increase occurred in the 200 by 200 ft model cell containing JDF-3, which is in the center of the injection area. The pressure increase at the top of the injection zone is 2.25 feet after 50 years. Based on the data shown in Figure 20, an area of about 17,088 acres experiences 1.0 foot or more of head increase.

To estimate the average vertical linear velocity through the overlying confining zone, Darcy's Law of flow through porous media was used. Darcy's Law is stated as:

$$q_s = -K \frac{dh}{dl} \frac{1}{n}$$

where:

q_s = vertical average linear velocity through confining zone (length/time)

dh = head difference across the confining zone (length)

dl = thickness of the confining zone (length)

n = effective porosity of the confining zone (-)

K = vertical hydraulic conductivity of the overlying units (length/time)

To calculate the volume of water per unit area moving upward into the confining zone (q), the vertical average linear velocity through confining zone (q_s) is multiplied by the effective porosity of the confining zone (n) as:

$$q = q_s \cdot n$$

Table 2

Proposed Exempt Aquifer Water Quality Analyses

In milligrams per liter (mg/L)

Parameter	Primary Standard	Injection Well			50-Year Projection
		JDF-1	JDF-2	JDF-3	
Antimony	0.006	N/A	< 0.01	< 0.01	BDL
Arsenic	0.01	0.0106	< 0.01	< 0.01	0.075
Barium	2	N/A	0.055	0.056	1.2
Beryllium	0.004	N/A	< 0.004	< 0.004	BDL
Cadmium	0.005	N/A	< 0.003	< 0.003	BDL
Chromium	0.1	N/A	< 0.010	< 0.010	BDL
Cyanide	0.2	N/A	< 0.02	< 0.02	BDL
Fluoride	4	3.11	1.09	1.12	4
Gross Alpha (less Ra and U)	15	412 ± 56.721	620 ± 170	774 ± 40	30
Mercury	0.002	N/A	< 0.0005	< 0.0005	BDL
Nitrate	10	< 0.5	< 0.10	< 0.10	2
Nitrite	1	1.14	< 0.05	< 0.05	BDL
Ra-226 + Ra-228	5	N/A	15 ± 1	19 ± 2	3
Selenium	0.05	N/A	< 0.010	< 0.010	0.015
Thallium	0.002	N/A	< 0.010	< 0.010	BDL
Uranium (ug/l)	30	N/A	21	8.6	29

At source (x 1000)

75 mg/l

30,000 mg/l

3000 mg/l

15 mg/l

= Does Not Meet Primary Standard

BDL = Below Detection Limit

if this is the projected concentration at the boundary at 50 years then the injectate at the point of injection is 1000 times greater

At what point does a wastestream from a desal unit become hazardous?
Lmf Rick Ehrhart, X-6765

Found concentrate of Effluent in App. C.

The vertical hydraulic conductivity of the confining zone was based on the analysis of five feet of core extracted from the Percha Shale unit of the confining zone. Measured vertical hydraulic conductivity within the Percha Shale is 2.7E-6 ft/day. Assuming there is no vertical hydraulic gradient in the overlying units, the head difference across the 1,700 feet thick confining zone due to the pressure increase during injection is 2.25 feet. Assuming an effective porosity of 0.10, the vertical average linear velocity through the confining zone is calculated:

$$q_s = 2.7 \times 10^{-6}\ ft/day \cdot \frac{2.25\ ft}{1700\ ft} \cdot \frac{1}{0.10}$$

$$q_s = 3.6 \times 10^{-8}\ ft/day$$

Therefore, over the 50-year injection period, the upward vertical movement of the injected water through the overlying confining unit is:

$$3.6 \times 10^{-8}\ ft/day \cdot \frac{365.25\ day}{1\ yr} \cdot 50 yr = 6.5 \times 10^{-4}\ feet$$

The volume of injected water per unit area moving upward into the confining zone (q), is calculated as:

$$q = q_s \cdot n = 3.6 \times 10^{-8}\ ft/day \cdot 0.10 = 3.6 \times 10^{-9}\ ft/day$$

Making the conservative assumption that the increased pressure of 2.25 feet occurs over the entire 17,088 acres that experiences at least one foot of head increase, the volume of water moving into the confining zone through the 17,088 acres over the 50-year injection period is calculated as:

$$3.6 \times 10^{-9}\ ft/day \cdot \frac{365.25\ day}{1\ yr} \cdot 50 yr \cdot 17088 acre = 1.1\ acre - feet$$

Assuming that 3 MGD is constantly injected for 50 years, the total volume of water injected at the facility is calculated as:

$$3 \times 10^{6}\ gal/day \cdot \frac{365.25\ day}{1\ yr} \cdot 50 yr \cdot \frac{acre - feet}{325851\ gal} = 168137\ acre - feet$$

Therefore, the percentage of the injected water that moves upward into the confining zone during the 50-year injection period can be calculated as:

$$\frac{1.1\,acre-feet}{168137\,acre-feet}\cdot 100\% = 6.5x10^{-4}\,\%$$

ECONOMIC EVALUATION OF ALTERNATIVE WATER SUPPLY SOURCES

The proposed exempt aquifer is not a source of drinking water and will not serve as a source of drinking water in the future because it is situated at a depth and location which makes recovery of water for drinking water purposes economically and technically impractical. As previously discussed, the chemical characteristics of the aquifer would necessitate treatment prior to distribution as publicly-supplied drinking water. In addition to having a TDS level above 8,000 mg/L, the aquifer does not meet primary water quality standards for arsenic, gross alpha (less Ra and U), nitrite, and radium, making the use of groundwater from the aquifer impractical for human consumption.

Dr. Anthony Tarquin, Professor of Civil Engineering/Science Engineering at the University of Texas at El Paso, has conducted extensive research at the Center for Inland Desalination Systems on the use of membrane technology in the desalting of brackish water and wastewater. Due to the naturally occurring salinity levels in the Fusselman-Montoya-El Paso Group, Dr. Tarquin has concluded that in order for the groundwater to be used as a future source of drinking water, it would have to be subjected to rigorous treatment to remove the contaminants that are currently present. Dr. Tarquin has concluded that the injection of the concentrate would not render the groundwater either less treatable or more costly to treat than it already is. Dr. Tarquin's evaluation is included as Appendix F.

Despite the treatability of the water, the energy cost to pump from over 2,222 to 2,890 feet coupled with the disposal of brine concentrate from the treatment process make production of the proposed exempt aquifer economically impractical to render that water fit for human consumption. Production cost from the proposed exempt aquifer is estimated to be approximately $3,000 per acre-foot.

Suitable groundwater and surface water sources are available that can be treated through conventional means at a significantly less cost. Sources of water supply include the Rio Grande River, Hueco and Mesilla Bolsons, Capitan Reef, Antelope Valley, Wildhorse Ranch, and Dell City. A summary of the sources along with the estimated production/treatment costs is included in Table 4.

Rio Grande - The Rio Grande originates in southwestern Colorado and northern New Mexico, where it derives its headwaters from snowmelt in the Rocky Mountains. The Elephant Butte Dam and Reservoir in New Mexico is approximately 125 miles north of El Paso and can store over two million acre-feet of water. Water in the reservoir is stored for seasonal release to meet irrigation demands in the Rincon, Mesilla, El Paso, and Juárez Valleys. Above El Paso, flow in the River is largely controlled by releases from Caballo Reservoir located below Elephant Butte; while downstream from El Paso to Fort Quitman, flow consists of treated municipal wastewater from El Paso, treated and untreated municipal wastewater from Juárez, and irrigation return flow. El Paso obtains Rio Grande water through contracts with various irrigation districts. The cost of Rio Grande water to the city of El Paso is approximately $300 per acre-foot.

Hueco Bolson Aquifer - The Hueco Bolson aquifer extends from east of the Franklin Mountains in El Paso County southeastward into southern Hudspeth County, and is bounded on the east and north by the Hueco Mountains, the Diablo Plateau, and the Quitman Mountains. The aquifer also extends to the Sierra Juárez in Mexico. The Hueco Bolson along with the Mesilla Bolson (on the west side of the Franklin Mountains) provides approximately half of the municipal supply for the City of El Paso. It has been estimated that, in 2002, fresh groundwater storage in the El Paso portion of the Hueco Bolson was about 9.4 million acre-feet, and brackish groundwater storage (chloride concentration less than 750 mg/L) was about 12.3 million acre-feet (Hutchison, 2006). Production cost for fresh Hueco Bolson water by El Paso Water Utilities is approximately $163 per acre-foot, and production cost for brackish Hueco Bolson water including desalination at the Kay Bailey Hutchison Desalination Plant is about $534 per acre-foot.

Mesilla Bolson Aquifer - The Mesilla Bolson aquifer lies in the Upper Rio Grande Valley west of the Franklin Mountains and extends to the north into New Mexico where it is primarily used for agricultural and public supply purposes in New Mexico. The City of El Paso's Canutillo well field is located in the Mesilla Bolson. The Canutillo well field includes wells at three different depths, typically called the shallow, intermediate, and deep zones. Production cost for Mesilla Bolson water is approximately $163 per acre-foot.

Capitan Reef Aquifer - The Capitan Reef formed along the margins of the Delaware Basin, a late Paleozoic sea. The reef formed along the western and eastern edges of the basin in arc-like strips 10 to 14 miles wide. The majority of the aquifer is located in Culberson, Hudspeth, Jeff Davis, Pecos, Reeves, Ward, and Winkler Counties. The aquifer generally contains water of marginal quality, with most wells yielding water between 1,000 and 3,000 mg/L TDS. The city of El Paso has purchased Diablo Farms, which overlies the Capitan Reef in Hudspeth and Culberson Counties. Production cost from Diablo Farms for transport to El Paso is estimated to be approximately $1,000 to $1,400 per acre-foot.

Dell City - Dell City is located in northeast Hudspeth County. Groundwater in the Bone Spring-Victorio Peak Aquifer, which underlies the area, occurs in joints, fractures, and solution cavities that have developed in the nearly 2,000 feet of limestone. Groundwater in the area can be classified as slightly- to moderately-saline, with TDS of most of the aquifer water ranging from approximately 1,000 to more than 6,000 mg/L and averaging about 3,500 mg/L. Production cost from the Dell City area for transport to El Paso is estimated to be approximately $1,000 to $1,400 per acre-foot.

Antelope Valley and Wildhorse Ranch – Antelope Valley and Wildhorse Ranch are EPWU-owned lands in Culberson, Jeff Davis, and Presidio Counties. Groundwater in these areas occurs in the West Texas Bolson aquifer system, a series of fault-bounded, basin-filled aquifers. Production cost for these areas for transport to El Paso would be approximately $1,000 to $1,400 per acre-foot.

See top of page 20.

EL PASO WATER UTILITIES PUBLIC SERVICE BOARD

ANALYTICAL REPORT

LABORATORY SERVICES
4100-L DELTA DRIVE
TELEPHONE (915) 594-5725 FAX (915) 594-5430

Sampling Location: Kay Bailey Hutchison Desalination Plant
Art Ruiz (915) 621-2051
10751 Montana
El Paso, Texas 79935

Requested By: Bill Hutchison (915) 954-5516
Hydrogeology FAX: (915) 594-5572
1154 Hawkins
El Paso, Texas 79925

Laboratory #: 09-16525
Sample Identification: KB-Concentrate Effluent
Sampling Source: Concentrate Effluent
Sample Type: Grab

Date/Time Collected: 6/9/2009 @ 5:28
Collected By: EFD
Date Received: 6/9/2009
Report Date: 6/26/2009

Analysis	Analytical Method		Result	Dilution	Reporting Limit	Units	Analysis Date	Time	Analyzed By
Uranium, total	ASTMD2907-		7.7	1	0.5	pCi/L	6/10/2009	19:33	LH at HAZ
Uranium, total	ASTMD2907-		11	1	0.7	ug/L	6/10/2009	19:33	LH at HAZ
Asbestos	EPA 100.1/.2	<	0.1952	1	0.1952	S/L 10E6	6/15/2009	11:00	KM at CAS
Total Hardness as CaCO3	EPA 130.1		2160	10	50	mg/L	6/9/2009		LRA at INT
Odor	EPA 140.1	<	1.00	1	1	TON	6/10/2009		JV at ULI
Aluminum, soluble	EPA 200.7	<	0.020	1	0.02	mg/L	6/16/2009		RRH at MET
Barium, soluble	EPA 200.7		0.233	1	0.01	mg/L	6/16/2009		RRH at MET
Beryllium, soluble	EPA 200.7	<	0.002	1	0.002	mg/L	6/16/2009		RRH at MET
Boron, soluble	EPA 200.7		0.093	1	0.02	mg/L	6/16/2009		RRH at MET
Calcium,total	EPA 200.7		520	10	10	mg/L	6/9/2009		RRH at MET
Chromium, soluble	EPA 200.7	<	0.005	1	0.005	mg/L	6/16/2009		RRH at MET
Copper, soluble	EPA 200.7	<	0.010	1	0.01	mg/L	6/16/2009		RRH at MET
Iron, soluble	EPA 200.7		0.098	1	0.02	mg/L	6/16/2009		RRH at MET
Lithium, soluble	EPA 200.7		0.410	1	0.02	mg/L	6/16/2009		RRH at MET
Magnesium, total	EPA 200.7		139	10	0.5	mg/L	6/9/2009		RRH at MET
Manganese, soluble	EPA 200.7		0.138	1	0.01	mg/L	6/16/2009		RRH at MET
Nickel, soluble	EPA 200.7	<	0.010	1	0.01	mg/L	6/16/2009		RRH at MET
Phosphorous, Total	EPA 200.7		0.7	1	0.2	mg/L	6/9/2009		RRH at MET
Potassium total	EPA 200.7		60.7	10	2	mg/L	6/9/2009		RRH at MET
Sodium, total	EPA 200.7		2570	10	10	mg/L	6/9/2009		RRH at MET
Zinc, soluble	EPA 200.7	<	0.020	1	0.02	mg/L	6/16/2009		RRH at MET
Antimony, soluable	EPA 200.8	<	0.500	1	0.5	µg/L	6/9/2009		DAR at MET
Arsenic, soluable	EPA 200.8		39.4	1	0.5	µg/L	6/9/2009		DAR at MET
Cadmium, soluable	EPA 200.8	<	0.500	1	0.5	µg/L	6/9/2009		DAR at MET
Lead, soluable	EPA 200.8		0.500	1	0.5	µg/L	6/9/2009		DAR at MET
Selenium, soluable	EPA 200.8	<	0.500	1	0.5	µg/L	6/9/2009		DAR at MET
Silver, soluable	EPA 200.8	<	0.500	1	0.5	µg/L	6/9/2009		DAR at MET
Thallium, soluable	EPA 200.8	<	0.500	1	0.5	µg/L	6/9/2009		DAR at MET
Mercury, soluable	EPA 245.2	<	0.0005	1	0.0005	mg/L	6/12/2009		DAR at MET
Bromide	EPA 300.1 A.	<	0.25	5	0.05	mg/L	6/10/2009	15:12	WWW at INT
Chloride	EPA 300.1 A.		4260	100	1	mg/L	6/15/2009	14:30	WWW at INT
Fluoride	EPA 300.1 A.		2.81	5	0.1	mg/L	6/10/2009	15:12	WWW at INT
Nitrogen-Nitrate	EPA 300.1 A.	<	0.50	5	0.1	mg/L	6/10/2009	15:12	WWW at INT
Nitrogen-Nitrite	EPA 300.1 A.	<	0.25	5	0.05	mg/L	6/10/2009	15:12	WWW at INT
ortho-Phosphate	EPA 300.1 A.	<	0.25	5	0.05	mg/L	6/10/2009	15:12	WWW at INT
Sulfate	EPA 300.1 A.		902	100	1	mg/L	6/15/2009	14:30	WWW at INT
Gross Alpha, Less Radon & Uranium	EPA 900.0		12 (± 7)	1	6.4	pCi/L	6/11/2009	13:00	AN at HAZ

LBG-GUYTON ASSOCIATES

PROFESSIONAL GROUNDWATER AND ENVIRONMENTAL ENGINEERING

1101 CAPITAL OF TEXAS HIGHWAY
SUITE B-220
AUSTIN, TX 78746
512-327-9640
FAX: 512-327-5573
www.lbg-guyton.com

September 9, 2009

Mr. Ben Knape
Team Leader
Underground Injection Control Team
Industrial and Hazardous Waste Permits Section
Mail Code 130
P.O. Box 13087
Austin, Texas 78711-3087

Re: Analytical Report for EPWU Desalination Plant Concentrate Effluent
Application for Aquifer Exemption
TCEQ Authorization No. 5X2700062, WWC No. 12124075,
CN602957060/RN104809389
El Paso Desalination Plant

Dear Mr. Knape:

As a follow-up to our correspondence dated June 30, 2009 and our meeting of July 1, 2009, El Paso Water Utilities (EPWU) is pleased to submit an analytical report for an undiluted concentrate sample collected from the Kay Bailey Hutchison Desalination Facility on June 9, 2009. The delay in this submittal is due to the required laboratory turn-around time in sample analysis. With the availability of this recently-acquired data, EPWU and LBG-Guyton Associates have begun addressing issues noted in TCEQ's "Technical Notice of Deficiency #1" dated June 4, 2009.

Should you have any questions regarding the sample analyses, please do not hesitate to contact us.

Sincerely,

LBG-GUYTON ASSOCIATES

Brad L. Cross
Associate

Attachment

EL PASO WATER UTILITIES PUBLIC SERVICE BOARD

ANALYTICAL REPORT

LABORATORY SERVICES
4100-L DELTA DRIVE
TELEPHONE (915) 594-5725 FAX (915) 594-5430

Sampling Location: Kay Bailey Hutchison Desalination Plant
Art Ruiz (915) 621-2051
10751 Montana
El Paso, Texas 79935

Requested By: Bill Hutchison (915) 954-5516
Hydrogeology FAX: (915) 594-5572
1154 Hawkins
El Paso, Texas 79925

Laboratory #: 09-16525
Sample Identification: KB-Concentrate Effluent
Sampling Source: Concentrate Effluent
Sample Type: Grab

Date/Time Collected: 6/9/2009 @ 5:28
Collected By: EFD
Date Received: 6/9/2009
Report Date: 6/26/2009

Analysis	Analytical Method		Result		Dilution	Reporting Limit	Units	Analysis Date	Analysis Time	Analyzed By
Gross Alpha, total	EPA 900.0		20 (± 7)		1	6.4	pCi/L	6/11/2009	13:00	AN at HAZ
Gross Beta, total	EPA 900.0		0.4 (± 6.2)		1	6.2	pCi/L	6/11/2009	13:00	AN at HAZ
Radium-228, total	EPA Ra-05		2.1 (± 0.8)		1	0.7	pCi/L	6/11/2009	12:55	SB at HAZ
Color	SM 2120 E	<	25	DH	1	25	ADMI	6/9/2009	13:55	YLR at DMD
Color, pH adjusted to 7.6	SM 2120 E	<	25		1	25	ADMI	6/9/2009	13:55	YLR at DMD
Turbidity	SM 2130 B		0.05		1	0.02	NTU	6/9/2009	12:05	GQG at WET
Alkalinity, Total	SM 2320 B		312	MH	1	5	mg/L	6/9/2009		DDH at WET
Electrical Conductivity	SM 2510 B		15400		2	10	µmho/cm	6/9/2009		LQM at WET
Total Dissolved Solids	SM 2540 C		9470		1	1	mg/L	6/9/2009		JCC at DMD
Temperature	SM 2550 B		26.5		1	0.1	°C	6/9/2009	5:28	EFD at Field
Total Organic Carbon	SM 5310 B.	<	1.0		1	1	mg/L	6/11/2009		AJM at INT
Radium-226, total	SM 7500-Ra B		3.3 (± 0.5)		1	0.1	pCi/L	6/11/2009	10:25	AN at HAZ
Langlier Index	SM2330 B		1.41		1			6/16/2009		RMA at WET
Cyanide, Total	SM4500 CN E	<	0.02		1	0.02	mg/L	6/17/2009		ASK at CAS
pH	SM4500 H+ B		7.8		1	2	pH units	6/9/2009	5:28	EFD at Field
Hydrogen Sulfide	SM4500-S2-	<	0.1		1	0.1	mg/L	6/9/2009	5:28	EFD at Field
Silica	SM4500-Si F		110		5	5	mg/L	6/16/2009		JVC at INT
Surfactants	SM5540 A	<	0.02		1	0.02	mg/L	6/9/2009		YLA at WET

MH-The Matrix Spike and/or Matrix Spike Duplicate (MS/MSD) recovery for this analyte were above the laboratory quality control limit. The reported sample concentration is estimated.

Subcontractors

CAS	Continental Analytical Services	525 N. Eighth St.	Salina, Kansas 67402-3737	KDHE: E-10146
CSP	Crisp Analytical	2081 Hutton Drive, Suite 301	Carrollton, Texas 75006	
HAZ	Hazen Research, Inc	4601 Indiana St	Golden, Colorado 80403	
ULI	Underwriters Laboratories Inc.	110 South Hill Street	South Bend, Indiana 46617-27	KS: E-10233

Paul R. Rivas
Laboratory Services Manager

6/26/2009
Date

Analyses performed utilizing procedures published in Standard Methods for the Examination of Water and Wastewater, 21st Edition 2005 or EPA Methods for the Chemical Analysis of Water and Wastes [EPA-600/4-79-020], March 1983 and the latest promulgated updates.

Brad Cross

From: Brad Cross
Sent: Friday, May 06, 2011 11:40 AM
To: 'bssmith@tceq.state.tx.us'
Cc: James Beach; David O'Rourke; 'sreinert@epwu.org'
Subject: FW: El Paso Model Information
Attachments: Modman.pdf; MT3DMS_manual.pdf; image002.png; image004.png; image006.png; image008.png; image001.png; image002.png; image003.png; image004.png

Good Morning Bryan,

As a follow-up to our telephone discussion this morning, below you will find a brief summary of both the MODFLOW and MT3D programs. We have also attached user guides for both programs should you desire additional information.

Should you have any further questions on the use of the models, please do not hesitate to let us know.

Thanks!

Brad

MODFLOW is a public domain code that simulates the three-dimensional movement of groundwater through porous earth material described by the partial differential equation:

$$\frac{\partial}{\partial_x}\left(K_{xx}\frac{\partial h}{\partial x}\right)+\frac{\partial}{\partial_y}\left(K_{yy}\frac{\partial h}{\partial y}\right)+\frac{\partial}{\partial_y}\left(K_{zz}\frac{\partial h}{\partial z}\right)-W=S_s\frac{\partial h}{\partial t}$$

Where

K_{xx}, K_{yy}, and K_{zz} are values of hydraulic conductivity along the x, y, and z coordinate axes, which are assumed to be parallel to the major axes of hydraulic conductivity;

h is the potentiometric head;

W is a volumetric flux per unit volume and represents sources and/or sinks of water;

Ss is the specific storage of the porous material;

t is time.

This equation, together with specification of flow and/or head conditions at the boundaries of an aquifer system and specification of initial head conditions, describes a groundwater flow system under nonequilibrium conditions in a heterogeneous and anisotropic medium, provided the principal axes of hydraulic conductivity are aligned with the coordinate directions. MODFLOW uses a block-centered finite-difference approximation to solve the partial differential equation for each grid cell and time step defined in the model.

MT3D is a public domain three-dimensional transport model commonly used in contaminant transport modeling and remediation assessment studies. (MT3DMS refers to a recent update that incorporates changes for Multiple Species).

MT3D can be used to simulate changes in concentration of contaminants in groundwater considering advection, dispersion, diffusion, and some basic chemical reactions, with various types of boundary conditions and external sources or sinks. It is designed for use with any block-centered finite difference flow model, such as MODFLOW. The partial differential equation describing the fate and transport of contaminants of species k in three-dimensional, transient groundwater flow systems can be expressed as follows:

$$\frac{\partial(\theta C^k)}{\partial t} = \frac{\partial}{\partial x_i}\left(\theta D_{ij}\frac{\partial C^k}{\partial x_j}\right) - \frac{\partial}{\partial x_i}(\theta v_i C^k) + q_s C_s^k + \sum R_n$$

Where

C^k is the dissolved concentration of species k;

Θ is the porosity of the subsurface medium;

t is time;

x_i is the distance along the respective Cartesian coordinate axis;

D_{ij} is the hydrodynamic dispersion coefficient tensor;

v_i is the seepage or linear pore water velocity; it is related to the specific discharge or Darcy flux through the relationship, $v_i = q_i/\Theta$;

q_s is the volumetric flow rate per unit volume of aquifer representing fluid sources (positive) and sinks (negative);

C_s^k is the concentration of the source or sink flux for species k;

$\sum R_n$ is the chemical reaction term;

More detailed information on the derivation and manipulation of the fate and transport equation is contained in Chapter 2 of the documentation and user's guide for MT3D, which is attached to this email. A link to the original documentation of MODFLOW, including details of the groundwater flow equation and the finite-difference application, is included in the electronic manual for MODFLOW, also attached.

The following documents are copies of the correspondence in the envelope that came with the formal application

LBG-GUYTON ASSOCIATES

PROFESSIONAL GROUNDWATER AND ENVIRONMENTAL ENGINEERING

1101 CAPITAL OF TEXAS HIGHWAY
SUITE B-220
AUSTIN, TX 78746
512-327-9640
FAX: 512-327-5573
www.lbgweb.com

April 5, 2011

Mr. John S. Hall
UIC Coordinator
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building
P.O. Box 26110
Santa Fe, New Mexico 87505

NM informed

Re: El Paso Water Utilities Aquifer Exemption Request

Dear Mr. Hall:

On February 1, 2011, El Paso Water Utilities (EPWU) received a letter from the Texas Commission on Environmental Quality (TCEQ) requesting clarification on several issues related to the proposed aquifer exemption. We have modified sections of the application in order to clarify several points. While modifications were made to the draft application, there continues to be no plume migration into the state of New Mexico.

In order to assure the state of New Mexico remains up to date on the application, please find attached a revised application text (April 2011) as well as affected figures, tables, and appendices. Please replace the affected pages in your April 2010 application.

As we progress through the approval process, we will continue to keep you updated on any changes. In the meantime, should you have any questions, please do not hesitate to give me a call at (512) 327-9640.

Sincerely,

LBG-GUYTON ASSOCIATES

Brad L. Cross
Associate

cc: Mr. Scott Reinert, EPWU
Mr. Ben Knape, TCEQ

LBG-GUYTON ASSOCIATES

PROFESSIONAL GROUNDWATER AND ENVIRONMENTAL ENGINEERING

1101 CAPITAL OF TEXAS HIGHWAY
SUITE B-220
AUSTIN, TX 78746
512-327-9640
FAX: 512-327-5573
www.lbg-guyton.com

April 23, 2010

Mr. Ben Knape, P.G.
Team Leader
Underground Injection Control Permits Team
Radioactive Materials Section
Mail Code 233
P.O. Box 13087
Austin, Texas 78711-3087

Re: Technical Notice of Deficiency No. 1
Application for Aquifer Exemption
Class V Authorization 5X2700062, Tracking No. 12421324-1
CN602957060/RN104809389
Kay Bailey Hutchison Desalination Plant

Dear Mr. Knape:

In response to the Texas Commission on Environmental Quality's (TCEQ) correspondence dated June 4, 2009, enclosed you will find one original and two copies of the revised Aquifer Exemption application.

El Paso Water Utilities (EPWU) requests the designation of an exempted aquifer in conjunction with the use of its Class V injection wells, TCEQ Authorization No. 5X2700062. EPWU requests that the portions of the aquifer described in its April 2010 application be exempt for purposes of the use of Class V injection wells to inject discharged water from a desalination plant used to convert brackish groundwater to potable water.

The enclosed documents should replace the current application package you have on file. While the revised document addresses each of the comments made in your June 4, 2009 correspondence, a short summary of the three primary issues follows:

1) *Provide copy of laboratory analysis of concentrate* – EPWU submitted a copy of the analytical report for an undiluted concentrate sample collected from the Kay Bailey Hutchison Desalination Facility to the TCEQ on September 9, 2009. A copy of the report has also been included in the revised Aquifer Exemption application as Appendix C. Moreover, Table 2 of the revised Aquifer Exemption application provides a 50-year projection of water quality parameters.

} banks unpaid concern about concentrations at the well site in 50 yrs

2) *Potentiometric Surface* – The potentiometric surface has been reevaluated and we have relied on published EPA documents, static water level measurements in the injection wells, previously published cross-sections, and a geologic structure map for the top of the Fusselman to refine our assessment of the regional potentiometric surface, hydraulic gradients, and potential flow directions. More specifically, in accordance with your June 4, 2009 letter, we have revised the steady-state potentiometric surface and created a structure map of the top of the Fusselman. These revisions are shown in Figures 17 and 19 of the revised Aquifer Exemption application. These changes were used to revise the geologic conceptual model. The data supports a south to southwesterly flow direction which has been incorporated into the revised conceptual model. These issues are described in detail in the hydrogeology and modeling sections of the application.

3) *Hydrogeologic Gradient* – Based upon your June 4, 2009 letter requesting justification of our modeling, we have revised the direction and magnitude of the groundwater gradient used to model the extent of the injectate plume. A brief summary of the analysis supporting the revision follows. Static water level measurements in the three injection wells indicate a hydraulic gradient of 0.008 foot/foot in the direction of 60 degrees west of south. However, the northwest-southeast faulting is expected to have some impact on local water levels and flow directions. EPA documents (Transboundary Aquifers of the El Paso/Ciudad Juarez/Las Cruces Region, 1997) support a southerly regional flow direction in the nearby Hueco-Tularosa aquifer but indicates that flow directions near the injection wells are influenced by complex geology. For the purposes of this evaluation, it was assumed that regional groundwater flow was to the south in the injection zone. While the local hydraulic flow gradient measured at the site (0.008 foot/foot) was considered in developing the flow model, it was determined that this local gradient did not represent regional conditions. This decision was based on two observations. First, the complex nature of the geology and faulting in the area of the wells used to estimate the gradient. Second, the local gradient is significantly higher than the hydraulic gradient in the nearby Hueco-Tularosa aquifer. EPA indicates that the southerly gradient in the Hueco-Tularosa aquifer is about 0.0015 foot/foot. Therefore, it was determined that the regional hydraulic gradient in the Fusselman-Montoya-El Paso Group was 0.003 foot/foot. These issues are described in detail in the hydrogeology and modeling sections of the application.

As previously discussed, the original modeling effort was based on an ultra-conservative modeling approach that produced an extensive proposed exempt area. Based on additional discussions with the TCEQ since the original submittal, LBG-Guyton Associates has refined the numerical model grid to reduce artificial numerical dispersion in the model. This refinement resulted in an improved model that reduced the numerical dispersion that caused the original exempt area to extend into New Mexico. The refined model results in a smaller proposed area of exemption and predicts that the plume does not migrate into the State of New Mexico.

Therefore, we will be requesting a withdrawal of the aquifer exemption request from the New Mexico Environment Department.

Since our original Aquifer Exemption submittal to the TCEQ in August 2008, numerous discussions with agency staff has resulted in the refinement of a proposed exempt area that is key to the successful operation of the Kay Bailey Hutchison Joint Desalination facility. This revised application package clearly resolves several discussed issues, including:

- The areal extent of the aquifer exemption request is based on the plume that would be generated from the injection of concentrate at a constant rate of 3 MGD for 50 years. Actual rate of injection for the concentrate will be based on plant operation that will be governed by the availability of surface water. Specifically, during times of "full" river allocation, groundwater pumpage from the Hueco Bolson and operation of the plant will be minimal. Under "drought" conditions, groundwater from the Hueco Bolson and operation of the plant will be maximized to make up for the shortage of surface water. In addition to drought protection, the plant will be used to provide for growth, meet peak demands, and be used if there is a disruption in other supplies. It is anticipated that the actual amounts of injection will be, on the average, less than the constant rate of 3 MGD for 50 years. As such, the area requested for the aquifer exemption is considered to be more than sufficient.

- The aquifer is not a source of drinking water for human consumption. Its remoteness and depth renders it an economically and/or technologically impractical source of drinking water;

- The aquifer does not represent a future source of drinking water because in addition to having a TDS level above 8,000 mg/L, the aquifer does not meet primary water quality standards for arsenic, gross alpha, nitrite, and radium, making the use of groundwater from the aquifer impractical for human consumption. The undiluted, non-hazardous concentrate does not significantly affect the existing groundwater quality of the proposed exempt aquifer. Extensive research has been conducted at the University of Texas at El Paso's Center for Inland Desalination Systems on the use of membrane technology in the desalination of brackish water and wastewaters. The center has determined that in order for the Fusselman-Montoya-El Paso Group groundwater to be used as a future source of drinking water, it would have to be subjected to rigorous treatment to remove the natural contaminants that are currently present and that the injection of the concentrate would not render the groundwater either less treatable or more costly to treat than it already is;

- Alternative sources of drinking water are available in the area, are of higher quality, and can be produced at a significantly less cost per acre-foot basis;

We sincerely appreciate your consideration of the revised application package and look forward to a favorable response from the Underground Injection Control Permits Team in the near future.

Sincerely,

LBG-GUYTON ASSOCIATES

Brad L. Cross
Associate

LBG-GUYTON ASSOCIATES

PROFESSIONAL GROUNDWATER AND ENVIRONMENTAL ENGINEERING

1101 CAPITAL OF TEXAS HIGHWAY
SUITE B-220
AUSTIN, TX 78746
512-327-9640
FAX: 512-327-5573
www.lbgweb.com

April 5, 2011

Mr. Bryan S. Smith, Project Manager
MC-233
Underground Injection Control Permits Team
Radioactive Materials Division
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, Texas 78711-3087

Re: EPWU Application for Aquifer Exemption
Class V Authorization 5X2700062, Tracking No. 12421324-1
CN602957060/RN104809389
Kay Bailey Hutchison Desalination Plant

Dear Mr. Smith:

In response to your correspondence dated February 1, 2011, El Paso Water Utilities (EPWU) is pleased to provide additional clarification on the subject aquifer exemption in order for the Texas Commission on Environmental Quality's (TCEQ) Underground Injection Control (UIC) staff to continue the technical evaluation of the aquifer exemption application. We have modified sections of the application in order to clarify specific points discussed in your correspondence and are including all revised documents in triplicate. To briefly summarize the changes made, your comments are repeated below along with an EPWU response.

TCEQ Comment: **Please indicate in the reservoir modeling section of the application (and any other appropriate section) the number of wells that the model is based on and how much of the 3 MGD injectate is going into each well.**

EPWU Response: The model is based on injection into four wells, including active wells JDF-1, JDF-2, and JDF-3 as well as proposed well JDF-5. The model was used to simulate the pressure buildup in the injection zone as a result of a maximum constant rate of 3 MGD for 50 years. The distribution of injection between the four injection wells was modeled as follows. Wells JDF-1 and JDF-5 injected fluid at 0.15 MGD each. Wells JDF-2 and JDF-3 injected fluid at 1.35 MGD each. However, the actual rate of injection for the concentrate will be based on plant operation that will be governed by the availability of surface water, population growth, meeting peak demands, and any disruption in other supplies. The actual amounts of injection will be less than the

constant rate of 3 MGD for 50 years and the area requested for exemption is ultra conservative.

TCEQ Comment: **Page 17 of the application says "The proposed exempt aquifer is under artesian pressure and rose to a height of approximately 500 ft BGL in the injection wells." On page 22 of the application it says "Water levels in the three injection wells were measured in March 2007. The measurements were 3,660 ft in JDF-1, 3,616 ft in JDF-2, and 3,633 ft in JDF-3." These two statements indicate different water levels. Please clarify.**

EPWU Response: The water levels mentioned in the two statements are consistent. The reference on page 17 reflects a measurement of approximately 500 feet below ground level (land surface). The surface elevation in this area is approximately 4,152 feet. If you subtract 500 from 4,152, the artesian level is consistent with those discussed on page 22 of the application. The text of the revised application has been modified for greater clarity.

TCEQ Comment: **Page 23 of the application states that the hydraulic gradient in the Fusselman-Montoya-El Paso Group was determined to be 0.003 foot/foot. Please explain how this number was determined.**

EPWU Response:
Water levels in the three injection wells were measured in March 2007. The measurements were 3,660 feet in JDF-1, 3,616 in JDF-2, and 3,633 in JDF-3. The resulting hydraulic gradient was 0.008 foot/foot in the direction 60 degrees west of south. The impact of the local faulting on the local hydraulic gradient is not known, but the northwest-southeast faulting is expected to have some impact on local water levels and flow directions. The hydraulic gradient measured at the site was used in conjunction with the regional flow patterns as a basis for setting boundary conditions on the north and south ends of the flow model. EPA (1997) documents a southerly regional flow direction in the nearby Hueco-Tularosa aquifer but indicates that flow directions near the injection wells are influenced by complex geology. For the purposes of this modeling, it was assumed that regional groundwater flow was to the south in the injection zone as well. While the local hydraulic flow gradient measured at the site (0.008 foot/foot) was considered in developing the flow model, it was determined that this local gradient did not represent regional conditions. This conclusion was based on two observations. First, the complex nature of the geology and faulting in the area of the wells used to estimate the gradient. This faulting provides significant potential for localized anomalies in hydraulic gradient. Second, the local gradient (0.008 foot/foot) is significantly higher than the hydraulic gradient in the regional Hueco-Tularosa aquifer. EPA (1997) indicates that the southerly gradient in the shallow aquifer is about 0.0015 foot/foot, based on the documented head difference between the Texas-New Mexico border and the Rio Grande River to the south. The measurements indicate that the local gradient calculated from the three wells is significantly higher than the regional gradient of 0.0015 foot/foot. This finding is consistent with *Groundwater* (1979), which documents how topography and hydrogeology can impact regional flow systems. Additionally, Toth (1963) indicates that

deeper units in regional flow systems generally have similar but lower hydraulic gradients than the shallower units in the same system. Therefore, the regional hydraulic gradient for the Fusselman-Montoya-El Paso Group is represented in the model at 0.003 foot/foot, which is higher than the measured regional gradient of 0.0015 but lower than the local gradient of 0.008. This simulated hydraulic gradient is conservative and still indicative of the regional flow in the Hueco-Tularosa system. Based on findings from other regional systems, we feel it is appropriate to use the regional gradient in the injection zone.

The text of the application has been modified for clarification.

TCEQ Comment: **On page 8 of the application it is stated that the exemption meets the criteria of "it cannot now and will not serve as a source of drinking water…" and on page 20 it is indicated that there is a possibility of it serving as a drinking water source later. Please clarify this.**

EPWU Response: EPWU remains firm in its statement that the Fusselman cannot now and will not serve as a source of drinking water. Due to its great depth and poor water quality, use of the aquifer is economically and technically impractical. We have modified page 20 of the application to parallel our statement on page 8.

TCEQ Comment: **Please provide a figure showing the depth of the top of the injection zone throughout the exempted area and make any adjustments in the area extent of the proposed exemption appropriate under the criteria of 30 TAC §331.13 to justify the proposed exemption.**

EPWU Response: EPWU has developed a figure showing the depth to the top of the Fusselman throughout the proposed exempt area and is included as Figure 18. In an effort to be conservative and to assure all of the criteria of 30 TAC §331.13 are met, we have slightly modified the area for the proposed aquifer exemption. The aerial extent of the proposed area of exemption is described on page 7 of the application. Replacement figures for the application are included as an attachment to this correspondence.

TCEQ Comment: **Please clarify what was changed between the present and previous model runs to account for the plume movement change. What was refined in the model?**

EPWU Response: The specific south-southeast direction of flow in the 2008 Aquifer Exemption Application was based on a review of available literature and the test data from the injection site. These data inferred that flow from the injection site would be toward the south/southeast. This included: 1) the structure map for the area, 2) the gravity map for the area (Granillo, 2004), and a thermal map for the area (Witcher, 1997). At the time of the TCEQ review, Mr. David Murray (TCEQ) suggested a gradient toward the southwest, based on water levels in the three wells at the injection site. EPWU was aware of this apparent direction of flow towards the southwest but felt that the geologic

data referenced above indicated there was a strong anisotropy (fabric) toward the south-southeast, and therefore the direction of groundwater flow was more toward the south-southeast. We believe that the local gradient (to the southwest) calculated by the water level in three wells near the site is caused by different water levels in different fault blocks at the injection site. A more regional perspective, however, indicated a south-southeast flow direction.

Mr. Murray also made the observation that the Fusselman Formation outcropped along the east side of the Hueco Mountains (to the southeast of the injection site), and might be a possible area for Fusselman groundwater discharge. Because of the questions raised by TCEQ, EPWU reevaluated the direction of flow in a more regional context. This reinterpretation included a mapping of the Fusselman Formation in the Hueco Mountains (Figure 2, 2008 Revised Aquifer Exemption Application). This provided a more detailed structural map of the Fusselman for the groundwater model. This mapping indicated that the Fusselman in the area of the Hueco Mountains was eroded away and no longer existed. In the geologic past, the area had been uplifted and was now part of an eroded anticlinorium. This lack of Fusselman in the Hueco Mountains creates an area of "no flow" in the southeast part of the groundwater model. When the revised distribution of the Fusselman was input into the MODFLOW groundwater model, the regional direction of groundwater flow shifted. Because of this no flow section of the aquifer, regional groundwater flow in the Fusselman is toward the south, and the local gradient near the injection site is to the southwest, which is consistent with the direction of flow calculated from the measured water levels in the three wells at the injection facility. This southerly direction of both the regional flow and the anticipated injectate plume direction is also consistent with the groundwater flow direction in the overlying Hueco-Tularosa alluvial aquifer, as modeled by the U.S. Geological Survey (Heywood and Yager, 2003).

These figures were provided to TCEQ on June 24, 2010 and clarifications have been made in the revised application.

TCEQ Comment: **What are the flow boundaries and how were they determined?**

EPWU Response: Specific head boundaries at the northern edge (upgradient) of the model and on the southern edge (downgradient) of the model were defined. The specific head on the upgradient and downgradient edges of the model were 3,800 feet (amsl) and 2,900 feet (amsl), respectively. These boundary conditions were selected so that the model would reproduce the observed water level at the site (3,630 feet amsl). The eastern and western edges of the model were considered no-flow boundaries because they are roughly parallel to the regional groundwater flow. In the areas where the Fusselman-Montoya-El Paso Group is not present, only very low permeability rocks are present (King, 1945). Therefore, a no-flow zone was incorporated in those areas because it was assumed that no significant groundwater flow occurred in this area due to the uplift and low permeability rocks.

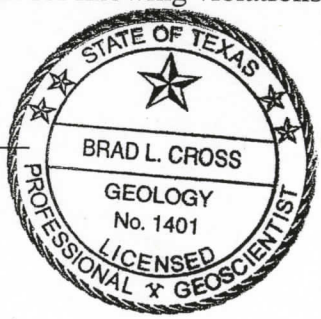
EPWU appreciates the initiative TCEQ has taken in holding discussions with EPA Region 6 on the pending application. Our review of the EPA's modeling checklist indicates that the checklist

is very thorough and is meant to cover a very wide range of hydrogeologic conditions, environments, modeling objectives and scenarios. The checklist serves as a good generic list of issues that should be considered for most models, but it is important to remember that local site conditions and modeling objectives vary dramatically from site to site and therefore, some items on the list become less relevant. In this case, the injection zone is very deep and is not used for water supply; therefore significantly less data and information is available to develop a model when compared to shallower systems that are modeled for regulatory purposes. Therefore, we ask that the TCEQ and EPA consider the site-specific constraints of the local area when considering the generic checklist.

We sincerely appreciate the interest you have shown in this project as well as the dedication of the UIC Team in the review of this application. We request that the proposed area be designated as the exempt area of the aquifer pursuant to El Paso Water Utilities' petition.

I, Brad L. Cross, Associate, certify under penalty of law that this revised documentation was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware there are significant penalties for submitting false information including the possibility of fine and imprisonment for knowing violations.

Brad L. Cross Date 4/5/2011



Attachments
cc: Ben Knape, TCEQ

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

June 7, 2011

instructions & public notice

Mr. Edmund G. Archuleta
El Paso Water Utilities
1154 Hawkins Blvd.
El Paso, Texas 79925

Re: Applicant Name: El Paso Water Utilities
Facility Location: Fort Bliss Military Reservation, El Paso County
TCEQ Authorization Number: 5X2700062
Customer Reference Number: CN600745392
Regulated Entity Number: RN103778882
Type of Authorization: Aquifer Exemption

Dear Mr. Archuleta:

The executive director has completed the technical review of the above referenced application for aquifer exemption and has prepared a preliminary decision.

You are now required to publish another notice of your proposed activity. To help you meet the requirements associated with this notice, we have included the following items:

- Instructions for Public Notice
- Notice for Newspaper Publication
- Publisher's Affidavits
- Executive Director's Technical Summary and Draft Aquifer Exemption Order
- Public Notice Verification Form

You must follow all the directions in the enclosed instructions. The most common mistakes are the unauthorized changing of notice, wording, or font. If you fail to follow these instructions, you may be required to republish the notices.

The following requirements are also described in the enclosed instructions. However, due to their importance, they are highlighted here as well.

1. **Publish the enclosed notice once each week during the three weeks preceding the public meeting. You may be required to publish the notice in more than one newspaper to satisfy all of the notice requirements.**

2. On or before the date you publish notice, you must place the following items in a public place in the county where the facility is or will be located: (a) a copy of your aquifer exemption application, including any subsequent revisions; (b) the executive director's technical summary; and (c) the draft aquifer exemption order. These items must be accessible to the public for review and copying, must be updated to reflect changes to the application, and must remain in place until the commission has taken action on the application or the commission refers issues to the State Office of Administrative Hearings.

3. For each publication, return an original clipping of the newspaper notice that shows the publication date and newspaper name to the Office of the Chief Clerk within **10 business days** after notice is published in the newspaper.

4. Return the original enclosed Public Notice Verification and the Publisher's Affidavits to the Office of the Chief Clerk within **30 calendar days** after the notice is published in the newspaper.

If you do not comply with all the requirements described in the instructions, further processing of your application may be suspended or the agency may take other actions.

If you have any questions regarding publication requirements, please contact the Office of the Chief Clerk at (512) 239-3300. If you have any questions regarding the content of the notice, please contact the individual in the permitting area assigned to your application.

Sincerely,

Melissa Chao

Melissa Chao
Acting Chief Clerk
MC/BSS/nlc

Enclosures

cc: Kent Maggoner, El Paso, Region6

NOTICE OF APPLICATION AND PRELIMINARY DECISION FOR AN AQUIFER EXEMPTION UNDERGROUND INJECTION CONTROL AUTHORIZATION 5X2700062 AND NOTICE OF PUBLIC MEETING

APPLICATION. El Paso Water Utilities (EPWU), 1154 Hawkins Blvd, El Paso, TX 79925 submitted a request to the Texas Commission on Environmental Quality (TCEQ) for an aquifer exemption in connection with its Class V injection wells for the Kay Bailey Hutchinson Desalination Plant. The Class V injection wells were authorized by TCEQ on July 13, 2005.

An aquifer or portion of an aquifer may be designated as an exempted aquifer if it does not currently serve as a source of drinking water for human consumption; and it will not in the future serve as a source of drinking water for human consumption because it is: (a) mineral, hydrocarbon or geothermal energy bearing with production capability, (b) at a depth or location which makes recovery of water for drinking water purposes economically or technically impractical, (c) so contaminated that it would be economically or technologically impractical to render that water fit for human consumption, or (d) located above a Class III well mining area subject to subsidence or catastrophic collapse. The aquifer exemption is required to allow EPWU to inject concentrate water from the Kay Bailey Hutchinson Desalination Plant that does not meet all primary and secondary drinking water standards.

The Class V injection wells associated with the proposed aquifer exemption are located on Fort Bliss Military Reservation approximately 12 miles north of U. S. Highway 180 and 22 miles northeast of the Kay Bailey Hutchinson Desalination Plant in El Paso County, Texas. The Class V injection wells are located as follows: the well designated as JDF-1 at latitude 31° 59' 49" N, longitude 106° 06' 25" W; the well designated as JDF-2 at latitude 31° 58' 24" N, longitude 106° 06' 30" W; the well designated as JDF-3 at latitude 31° 59' 15" N, longitude 106° 06' 43" W; the well designated as JDF-4 at latitude 31° 59' 55" N, longitude 106° 07' 45" W; and the well designated as JDF-5 at latitude 31° 59' 13" N, longitude 106° 06' 05" W.

EPWU has requested that a portion of the Fusselman Formation, Montoya Group, and El Paso Group (hereinafter referred to as the Fusselman, Montoya, and El Paso group) be designated as an exempt aquifer. The proposed exemption extends over a rectangular area of 115 square miles, approximately 5.98 miles east to west and 19.2 miles north to south, in northeastern El Paso County. The northwest corner of the proposed exempt aquifer is located at latitude 32° 00' 13.38" N, longitude 106° 11' 49.28" W; the southwest corner is located at latitude 31° 43' 30.00" N, longitude 106° 11' 49.28" W; the southeast corner at latitude 31° 43' 30.00" N, longitude 106° 05' 42.12" W; and the northeast corner at latitude 32° 00' 12.74" N, longitude 106° 05' 42.12" W. Within this area, the top of the Fusselman, Montoya, and El Paso group ranges from 1,000 to 4,000 feet in depth. The aggregate thickness of the Fusselman, Montoya, and El Paso group within this area is approximately 2,480 feet.

The TCEQ Executive Director has completed the technical review of the application and has made a preliminary decision that the application for aquifer exemption meets all statutory and regulatory requirements. If approved by the TCEQ, the Executive Director will prepare an application to the U.S. Environmental Protection Agency (EPA) to revise the State's Underground Injection Control program to reflect the exemption of the relevant portion of the aquifer, which will be in effect until exemption status is removed. No designation of an exempted aquifer shall be final until approved by the EPA. The application for aquifer exemption and the Executive Director's preliminary decision will be available for viewing and

copying at the TCEQ central office in Austin and at the El Paso Main (Downtown) Public Library, 501 N. Oregon Street, El Paso, Texas 77901.

PUBLIC COMMENT / PUBLIC MEETING. A public meeting will be held on this application. The purpose of a public meeting is to ask questions about the application and provide the opportunity to submit comments. The public meeting will consist of two parts, an Informal Discussion Period and a Formal Comment Period. During the Informal Discussion Period, the public is encouraged to ask questions of the applicant and TCEQ staff concerning the application and the Executive Director's preliminary decision, but these informal comments made during the informal period will not be considered by the Commissioners before reaching a decision on the aquifer exemption and no formal response will be made. During the Formal Comment Period, members of the public may state their formal comments into the official record. The public comment period for this application will close at the conclusion of the public meeting or after the expiration of thirty days after the first date of newspaper publication of this notice, whichever is later. Written or oral comments must be submitted by the end of the comment period. A written response to all formal comments will be prepared by the Executive Director and considered by the Commissioners before they reach a decision on the aquifer exemption. A copy of the response will be sent to each person who submits a formal comment or who requested to be on the mailing list for this application and provides a mailing address.

The Public Meeting will be held:

Thursday, July 14, 2011, 7 pm

Tech H2O Center

10751 Montana Ave.

El Paso, Texas 79935

OPPORTUNITY FOR A CONTESTED CASE HEARING. A contested case hearing is a legal proceeding similar to a civil trial in a state district court. The TCEQ may grant a contested case hearing on this application if a written hearing request is filed within 30 days from the date of newspaper publication of this notice.

TO REQUEST A CONTESTED CASE HEARING, YOU MUST INCLUDE THE FOLLOWING ITEMS IN YOUR REQUEST: your name; address, phone; applicant's name and authorization number; the location and distance of your property/activities relative to the facility or activity; a specific description of how you would be adversely affected by the application in a way not common to the general public; and the statement "[I/we] request a contested case hearing."

If the request for contested case hearing is filed on behalf of a group or association, the request must designate the group's representative for receiving future correspondence; identify an individual member of the group who would be adversely affected by the application or activity; provide the information discussed above regarding the affected member's location and distance from the facility or activity; explain how and why the member would be affected; and explain how the interests the group seeks to protect are relevant to the group's purpose.

Following the close of all applicable comment and request periods, the Executive Director will forward the application and any requests for a contested case hearing to the TCEQ Commissioners for their consideration at a scheduled Commission meeting.

EXECUTIVE DIRECTOR ACTION. The Executive Director may issue approval of the application for the Commission unless a timely contested case hearing request or request for

reconsideration is filed. If a timely hearing request or request for reconsideration is filed, the Executive Director will not issue such approval of the aquifer exemption and will forward the application and request to the TCEQ Commissioners for their consideration at a scheduled Commission meeting.

MAILING LIST. If you submit public comments or a request for a contested case hearing, you will be added to the mailing list for this specific application to receive future public notices mailed by the Office of the Chief Clerk. In addition, you may request to be placed on: (1) the permanent mailing list for a specific applicant name and permit number; and/or (2) the mailing list for a specific county. If you wish to be placed on the permanent and/or the county mailing list, clearly specify which list(s) and send your request to TCEQ Office of the Chief Clerk at the address below.

All written public comments and requests must be submitted to the Office of the Chief Clerk, MC 105, TCEQ, P.O. Box 13087, Austin, TX 78711-3087 by the conclusion of the public meeting or within 30 days from the first date of newspaper publication of this notice, whichever is later.

AGENCY CONTACTS AND INFORMATION. If you need more information about this permit application or the permitting process, please call the TCEQ Office of Public Assistance, Toll Free, at 1-800-687-4040. Si desea información en Español, puede llamar al 1-800-687-4040. General information about the TCEQ can be found at our web site at www.TCEQ.state.tx.us.

Issued: June 7, 2011

Rings copy

EPWU's response to TCEQ's NOD

EL PASO WATER UTILITIES PUBLIC SERVICE BOARD

EDMUND G. ARCHULETA, P.E.

July 22, 2010

Certified Mail
Return Receipt Requested

Mr. Richard A. Hyde, P.E.
Deputy Director
Office of Permitting and Registration
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, Texas 78711-3087

Re: EPWU Application for Aquifer Exemption
Class V Authorization 5X2700062, Tracking No. 12421324-1
CN602957060/RN104809389
Kay Bailey Hutchison Desalination Plant

Dear Mr. Hyde:

As a follow-up to our conversation on June 15, 2010, El Paso Water Utilities (EPWU) staff met with Texas Commission on Environmental Quality's (TCEQ) Underground Injection Control (UIC) staff and have made good progress in clarifying several issues on the proposed aquifer exemption. As a follow-up to their meeting on June 24, 2010, EPWU promised to provide UIC staff with a written response summarizing the discussions held in that meeting. Attachment A of this letter is a document addressing TCEQ's comments and EPWU's response to those comments.

An additional outcome of the June 24th meeting was the realization that defining the area for the proposed aquifer exemption based on the physical coordinates of a modeled concentrate plume would be quite challenging and that it would be more effective to simply place a "box" around the concentrate plume and its one-quarter mile buffer zone, designating this "box" as the proposed exempted area. The revised proposed exempt area, along with replacement figures for the modified application, is included as Attachment B.

Agreed for purposes of clearly defining AE boundaries

We sincerely appreciate the interest you have shown in this project as well as the dedication of the Underground Injection Control Team in the review of this application. We request that the proposed area be designated as the exempt area of the aquifer pursuant to El Paso Water Utilities' petition.

Sincerely,

Edmund G. Archuleta, P.E.
President/Chief Executive Officer

Attachments
cc: Ben Knape, TCEQ

P.O. BOX 511 • EL PASO, TX 79961-0001 • PHONE: 915-594-5501 • FAX: 915-594-5699

ATTACHMENT A

EPWU Response to TCEQ Comments

EPWU Application for Aquifer Exemption
Response to TCEQ Comments of June 21, 2010

TCEQ Comment: Under the heading titled Groundwater Flow, (pg 19) LBG states that static water level data supports a south to southwesterly flow and groundwater movement to the south can be interpreted by the temperature gradient studies. In the 2008 application, LBG states that static water level data supports a south to southeasterly flow and groundwater movement to the south and southeast can be interpreted by the temperature gradient studies. Please provide the justification for this change in direction.

EPWU Response: The statement on Page 19 of the Revised Aquifer Exemption Application was meant to indicate that the flow direction throughout the region is generally to the south, as opposed to the north. Regional flow in the overlying Hueco-Tularosa alluvial basin is from north to south (EPA, 1997 and Heywood and Yager, 2003). A similar flow direction is to be expected in the underlying bedrock aquifers, such as the Fusselman Formation. Both the shallow alluvial sediments and the underlying bedrock units are part of the same regional groundwater flow system, whether it is fresh or brackish. The overlying alluvium and the underlying bedrock together are classified as a USDW (Underground Source of Drinking Water). Even though there is limited data in the deeper bedrock units, deeper brackish-saline formations, such as the Fusselman, are part of the same regional flow system. This concept of regional flow systems was first developed by Joseph Toth in 1963 (Exhibit 1) and further quantified by Al Freeze and Paul Witherspoon in the late 1960's (Exhibit 2) (Toth, 1963; and Freeze and Witherspoon, 1968). They showed that groundwater flow in deeper bedrock aquifers typically mimics shallow water table (alluvial) aquifers and that the direction of groundwater flow is typically from areas of higher topographic elevation to areas of lower topographic elevation. Major rivers, such as Rio Grande, are the primary zones of regional groundwater discharge. In the El Paso region, groundwater flow in these deeper bedrock units is still expected to be in the same general direction as the overlying alluvium, that is, from New Mexico to the south toward the Rio Grande. Hydraulic gradients in the deeper units are expected to be flatter.

explanation why GW flow is to the south

The specific south-southeast direction of flow in the 2008 Aquifer Exemption Application was based on a review of available literature and the test data from the injection site. These data inferred that flow from the injection site would be toward the South/Southeast. This included: 1) the structure map for the area (Exhibit 3), 2) the gravity map for the area (Granillo, 2004) (Exhibit 4), and a thermal map for the area (Witcher, 1997) (Exhibit 5). At the time of the TCEQ review, Mr. David Murray (TCEQ) suggested a gradient toward the southwest, based on water levels in the three wells at the injection site. EPWU was aware of this apparent direction of flow towards the southwest but felt that the geologic data referenced above indicated there was a strong anisotropy (fabric) toward the southeast (Exhibits 3,4, and 5), and therefore the direction of groundwater flow was more toward the southeast. The apparent gradient to the southwest as observed by TCEQ appears to be caused by different water levels in different fault blocks at the injection site. A more regional perspective, however, indicated a southeast flow direction.

complex geology at wellsites

Mr. Murray also made the observation that the Fusselman Formation outcropped along the east side of the Hueco Mountains (to the southeast of the injection site), and might be a possible area for Fusselman groundwater discharge. Because of the questions raised by TCEQ, EPWU reevaluated the direction of flow in a more regional context. This reinterpretation included a mapping of the Fusselman Formation in the Hueco Mountains (Figure 2, 2008 Revised Aquifer

not probable Fussel exposed over the Hueco Mt. Range outcrops on east side only

Exemption Application). This provided a more detailed structural map of the Fusselman for the groundwater model. This mapping indicated that the Fusselman in the area of the Hueco Mountains was eroded away and no longer existed. In the geologic past, the area had been uplifted and was now part of an eroded anticlinorium. This lack of Fusselman in the Hueco Mountains creats an area of "no flow" in the southeast part of the groundwater model. When the revised distribution of the Fusselman was input into the MODFLOW model, the regional direction of groundwater flow shifted. Because of this no flow section of the aquifer, groundwater flow in the Fusselman is now toward the south (Exhibit 6). This southerly direction of both the regional flow and the anticipated injectate plume direction parallels the groundwater flow direction in the overlying Hueco-Tularosa alluvial aquifer, as modeled by the U.S. Geological Survey (Exhibit 7, Heywood and Yager, 2003). This more regional perspective is considered more realistic.

Asserted GW flow shifted from SSE to S

agreed

agreed

on west side of Hueco Mts,

TCEQ Comment: **Under the heading titled "Conceptual Model" (pgs. 21 – 23), EPWU states that a groundwater flow direction of south was assumed for groundwater flow in the injection zone. This assumption was based on a similar flow direction for groundwater in sediments of the overlying Hueco-Tularosa Aquifer, as described in an EPA document. The TCEQ is unsure of the validity of this assumption for two reasons. First, the injection zone dips west, as is illustrated on Figure 17. Second, units of the injection zone crop out to the east in the Hueco Mountains (Figure 5), providing an area of recharge for the injection interval. These two features would favor a westward direction for groundwater flow. Please provide additional information to support a southward groundwater flow direction in the units of the injection zone.**

yes/ anticline

No - separated by erosion

EPWU Response: We agree that the Fusselman Formation beneath the eastern side of the Hueco Bolson dips to the west. Geologic structure may play a role in the flow direction of groundwater, however, this is not the primary determinant for the direction of groundwater flow. As noted in *Groundwater* (Freeze and Cherry, 1979), groundwater flows from higher "total potential" to lower "total potential." Regional flow in the overlying Hueco-Tularosa alluvial basin is from north to south (Heywood and Yager, 2003). A similar flow direction is to be expected in the underlying bedrock aquifers, such as the Fusselman Formation. The geologic section, from the shallow alluvial sediments to the underlying bedrock units, are part of the same regional groundwater flow system. A more detailed discussion of this topic is included above in EPWU's response to the first comment.

so does western side

Yes - main driver

Regarding TCEQ's comment about geologic units of the injection zone cropping out in Hueco Mountains, the Fusselman Formation crops out on the eastern side of the Hueco Mountains (Figure 8), that is, on the east side of the eroded anticline, and not on the west. Potential recharge of the Fussleman on the east side will flow to the east toward the Dell City area. This is documented in several scientific publications, including "Hydrogeology of the Diablo Plateau, Trans-Pecos, Texas," (Kreitler, Mullican and Nativ, 1990) which showed that the regional groundwater flow in the Diablo Plateau is to the east. Recharge to the Fusselman where it crops out on the eastern side of the Hueco Mountains is not expected to have any impact on groundwater flow in the Fussleman on the west side of the Huecos. On the west side of the Hueco Mountains, the Fusselman is not present as surface outcrop (Barnes, 1968). We do not expect any recharge of the Fussleman on the western side of the Hueco Mountains, because the Fussleman does not crop out on the western side.

agreed

TCEQ Comment: **Under the heading titled "Conceptual Model" (pgs. 21 – 23), EPWU states that the assumed groundwater gradient in the injection zone was 0.003 ft/ft, based in part on the groundwater gradient in the Hueco-Tularosa Aquifer, as reported in an EPA document. The TCEQ is unsure as to how this gradient was determined. It is the TCEQ's understanding that except for water level data from the three injection wells at the site, EPWU has no other groundwater level data for the area that was modeled. Given the size of the area modeled, the TCEQ is not convinced the groundwater gradient in the modeled area is valid. Please provide additional information to support the assumed gradient for the modeled area.**

yes, a lack of data across the evaporation area is a concern but what are you going to do?

EPWU Response: The hydraulic gradient was determined by measuring head difference over a given distance based on potentiometric maps developed from regional water level measurements. In this case, the maps were from the EPA publication "Transboundary Aquifers of the El Paso/Ciudad Juarez/Las Cruces Region" (1997). The estimated hydraulic gradient is conservative and still indicative of the regional flow in the shallower Hueco-Tularosa system. Based on findings from other regional systems, we feel it is appropriate to use the regional gradient and general flow direction for the deeper units such as the injection zone.

EPWU also refers TCEQ to *Groundwater* (Freeze and Cherry, 1979), which indicates how topography and hydrogeology can impact regional flow systems. Toth (1963) indicates that deeper units in regional flow systems generally have similar but lower hydraulic gradients than the shallower units in the same system. Relevant figures from Freeze and Cherry are included as Exhibits 1 and 2.

agreed

TCEQ Comment: **Under the heading titled "Model Development and Calibration" (pgs 24-25), EPWU states that the boundary conditions set for the model reproduced the observed water levels at the site. Therefore, model calibration appears to be based only on water levels in the three injection wells, which are in a small portion of the total area modeled. No other information was provided with regards to model calibration in other parts of the area modeled. The TCEQ does not agree that water level data from these three relatively closely spaced wells provides sufficient information for adequate calibration of the model, given the size of the area modeled. Please provide additional information for model calibration or please explain why no additional information is necessary for adequate model calibration.**

good point

EPWU Response: We agree with TCEQ that the three local water level measurements only represent a small portion of the system, therefore, EPWU also relied on regional measurements to calibrate the model. As discussed in the response to previous comments, the model calibration was based both on the water levels in the three injection wells as well as regional water level measurements (from EPA, 1997) and the inferred hydraulic gradients from those measurements.

did the best they can

of the Hueco Tularosa) still that's the best source available

TCEQ Comment: **Under the heading titled "Assessment of Vertical Plume Movement" (pgs. 27 – 29), LBG states that the area that experiences 1.0 foot or more of head pressure is 17,088 acres whereas previously stated (2008) it was 4,750 acres. Please justify the difference.**

EPWU Response: The statement in the revised application (April 2010) is correct. The area that experiences 1.0 foot or more of head pressure is 17,088 acres. The 2008 application reflects an administrative typographical error.

this is quite an understatement — the Fusselman & the head rises to within 500' of the surface at the wellsite

References

Barnes, U., 1968, Geologic Atlas of Texas Van Horn-El Paso Sheet, The Univeristy of Texas at Austin, Bureau of Economic Geology.

Freeze, A. and Cherry, J., 1979, Groundwater, Prentice Hall, 604 p.

Freeze, A. and Witherspoon, P., 1968, Theoretical analysis of regional groundwater flow: Quantitative interpretations, Water Resources Research, v.4, p. 581-590.

Granillo, J., 2004, A gravimetric study of the structure of the northeast portion of the Hueco Bolson, Texas employing GIS technology, University of Texas at El Paso Dissertation, 127 p.

Heywood, C.F., and Yager, R.M., 2003, Simulated groundwater flow in the Hueco Bolson, an alluvial aquifer system near El Paso, Texas, U.S. Geological Survey, Water Resources Investigations Report 02-4108, 74 p.

Kreitler, C., Mullican, W., and Nativ, R., 1990, Hydrogeology of the Diablo Plateau in Kreitler, C. and Sharp, J. (ed) Hydrogeology of Trans-Pecos Texas, The University of Texas at Austin, Bureau of Economic Geology Guidebook 25, p. 49-58.

Toth, J., 1963, A theoretical analysis of groundwater flow in small drainage basins, J. Geophysical Research, v 68, p. 4795-4812.

U.S. Environmental Protection Agency, 1997, Transboundary aquifers of the El Paso/Cuidad/Las Cruces Region, 148 p.

Witcher, J.C., 1997, Geothermal Resource Potential of McGregor Range, New Mexico, New Mexico State University, Southwest Technology Development Institute, GEO 97-5, 26 p.

I, Brad L. Cross, Associate, certify under penalty of law that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluation the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature Brad L Cross Date July 23, 2010

STATE OF TEXAS
BRAD L. CROSS
GEOLOGY
No. 1401
LICENSED
PROFESSIONAL GEOSCIENTIST

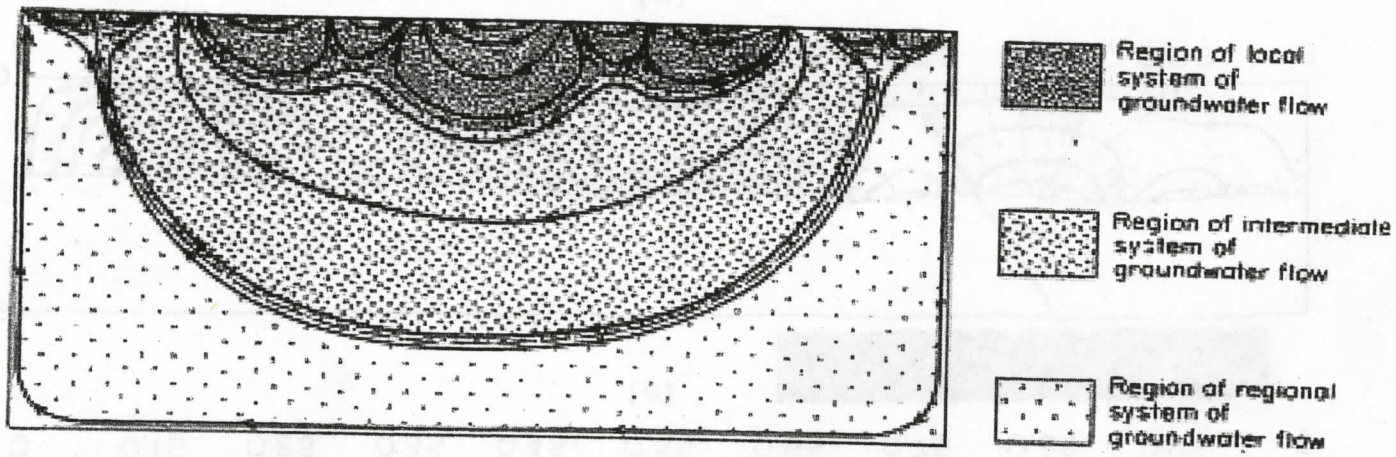


Exhibit 1 – Local, Intermediate and Regional Groundwater Flow (after Toth, 1963)

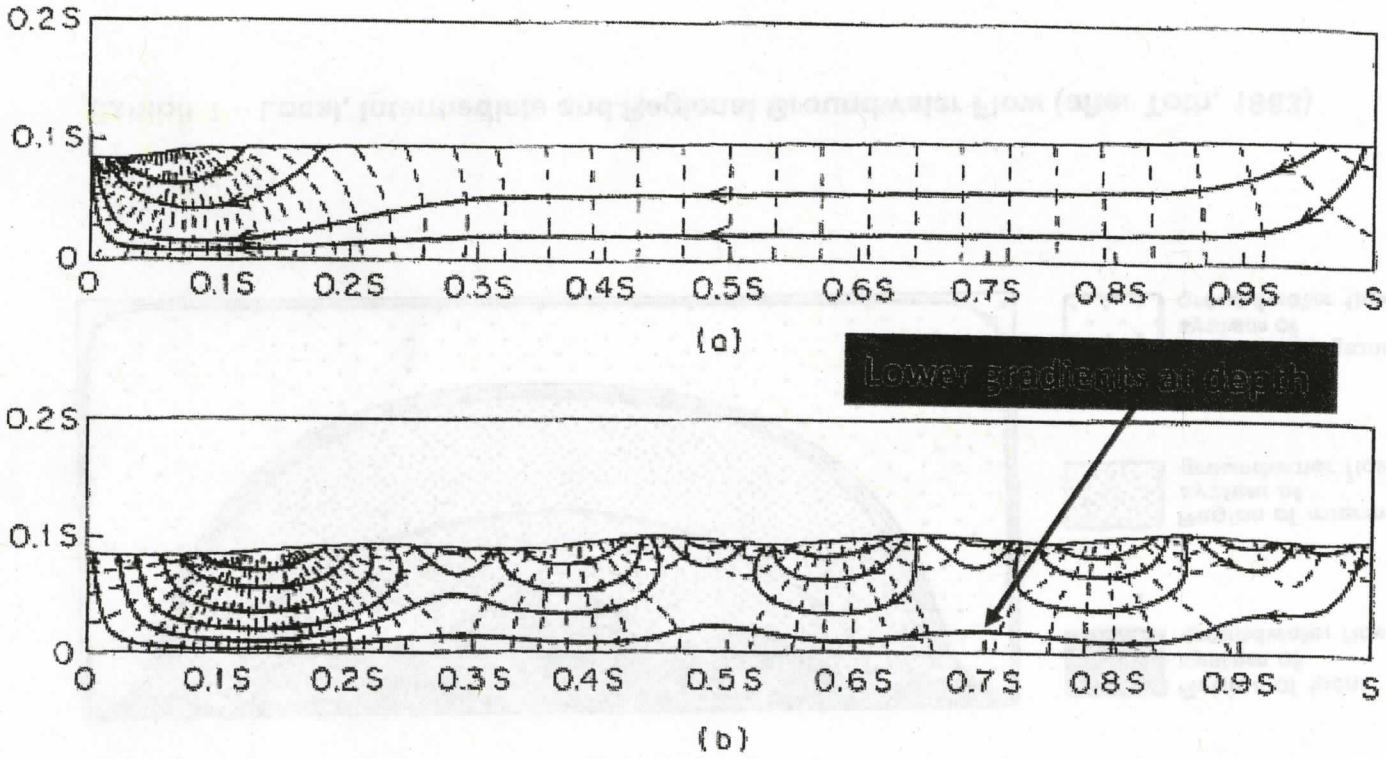


Exhibit 2 – Effect of topography on regional groundwater flow patterns (after Freeze and Witherspoon, 1967)

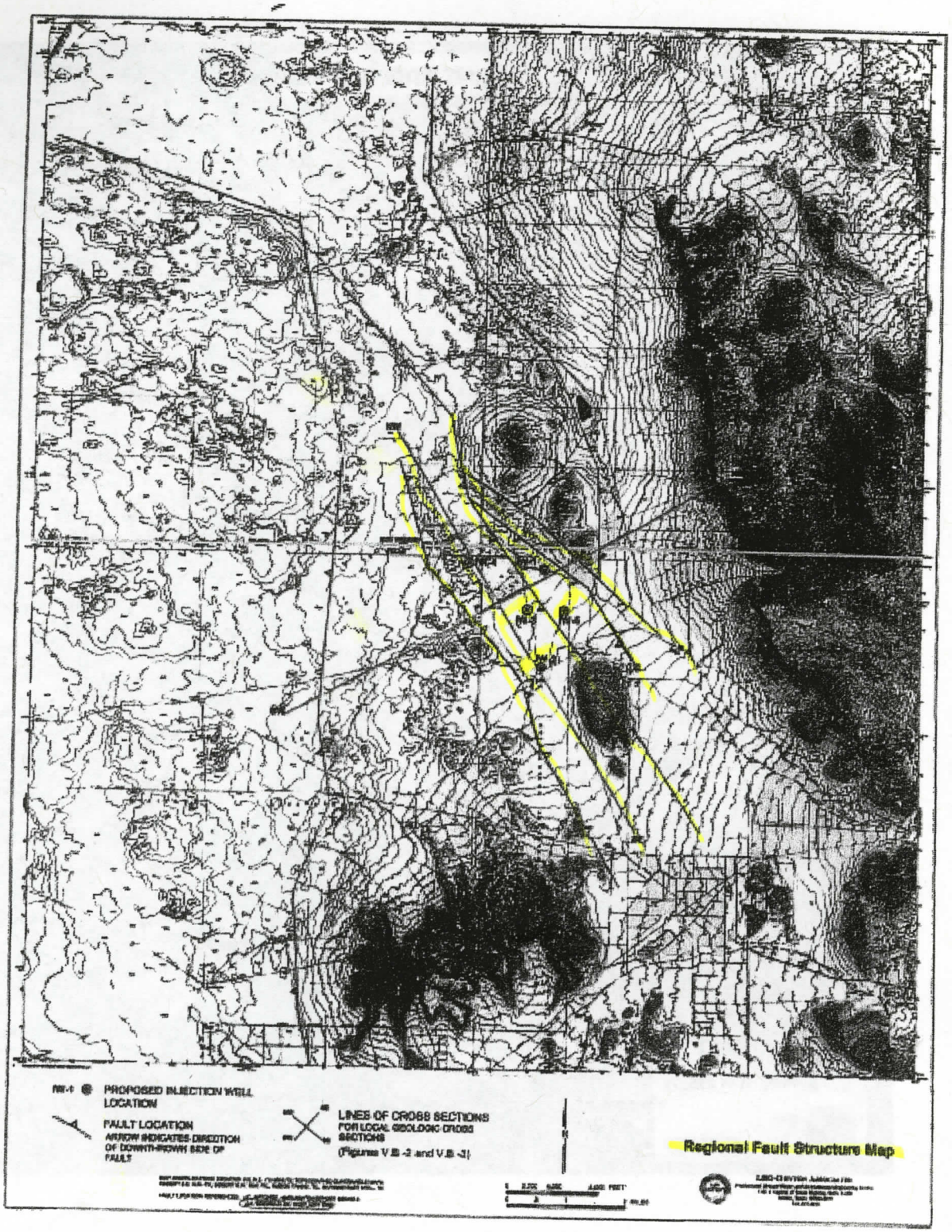


Exhibit 3 – Fault structure map - injection well site area

faults possibly causing a more SE flow at the wellsites -

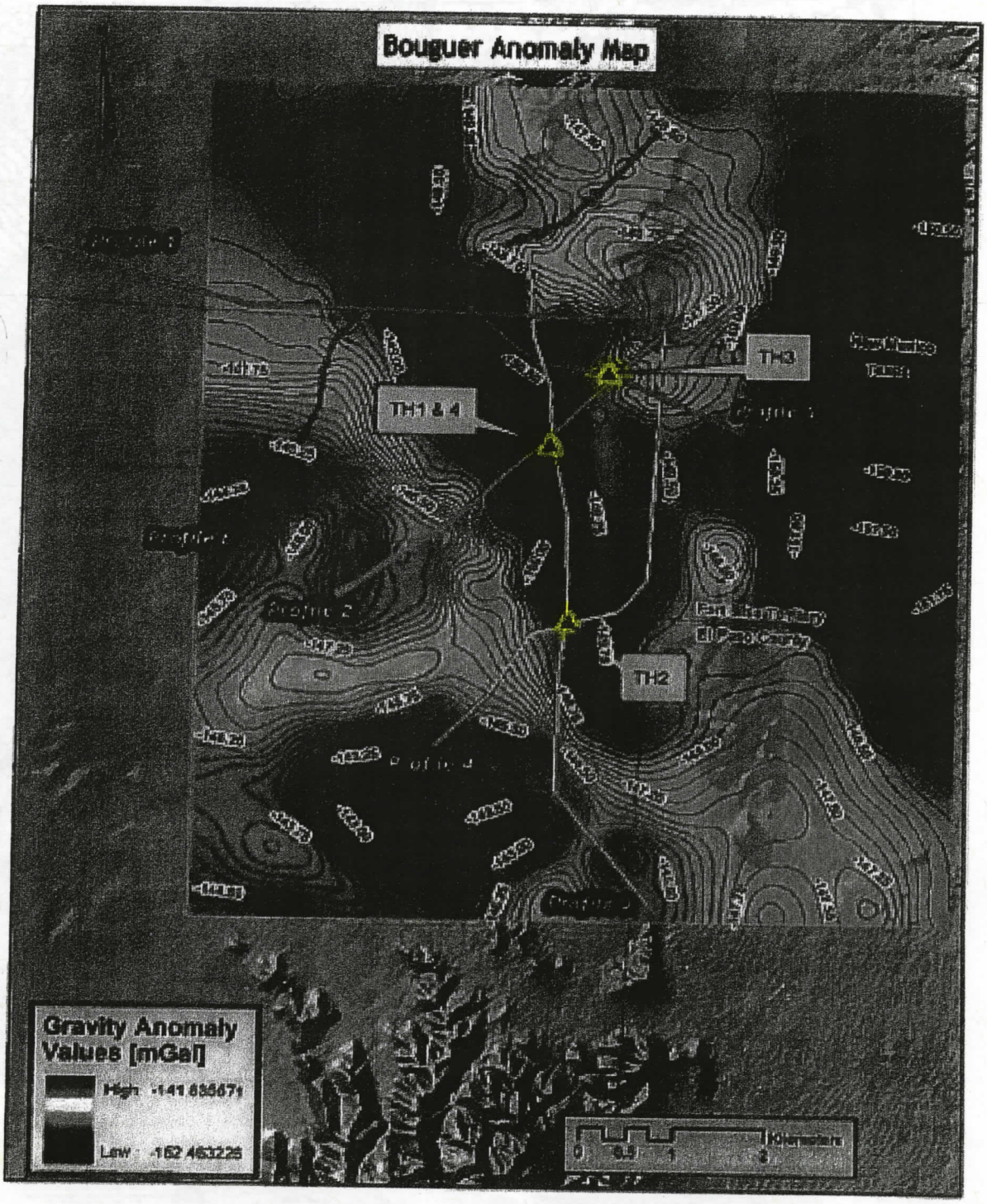


Exhibit 4 – Bouger anomaly map - injection site area (from Granillo, 2004)

shows Less MASS in the dark regions to what depths?

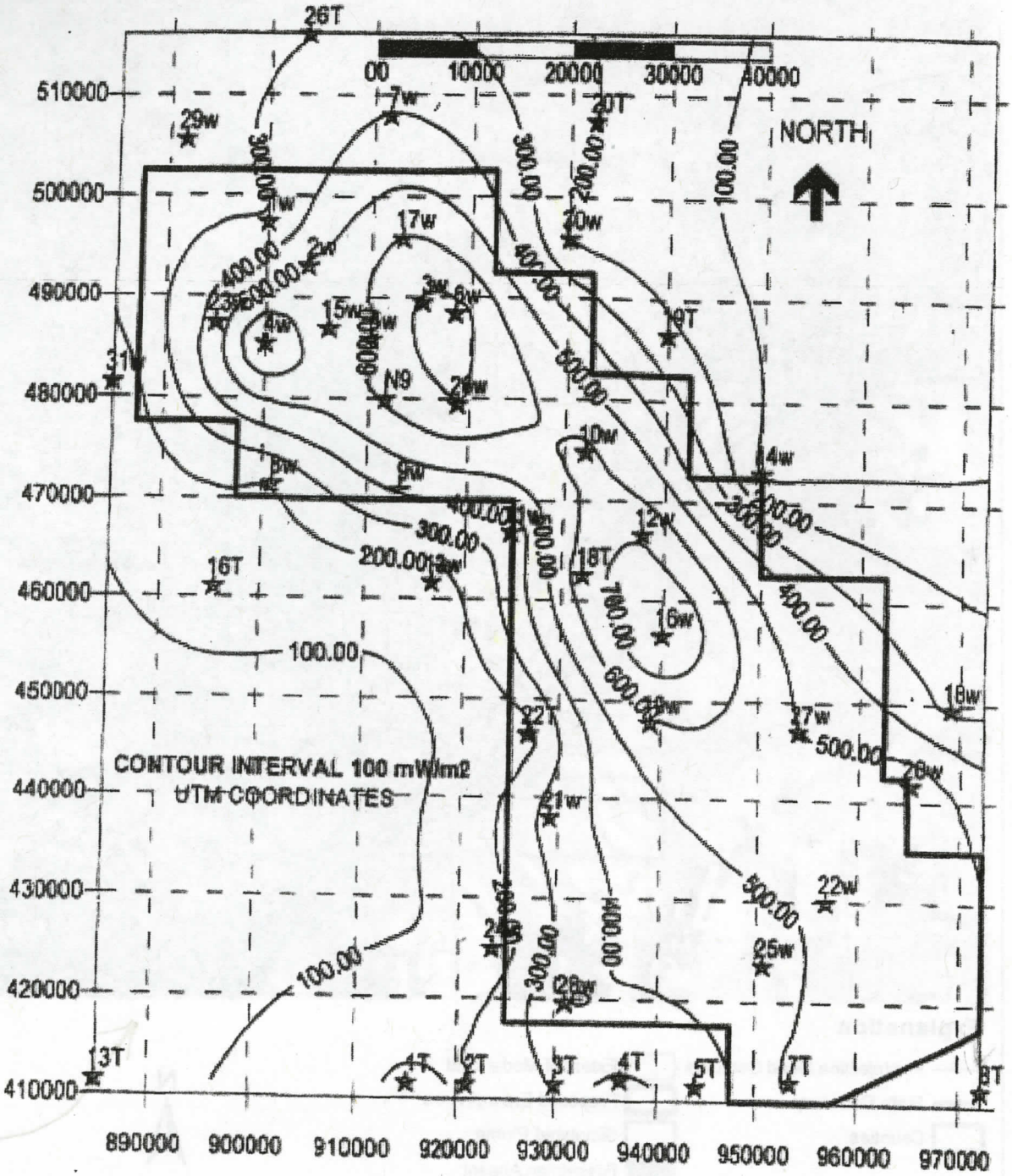
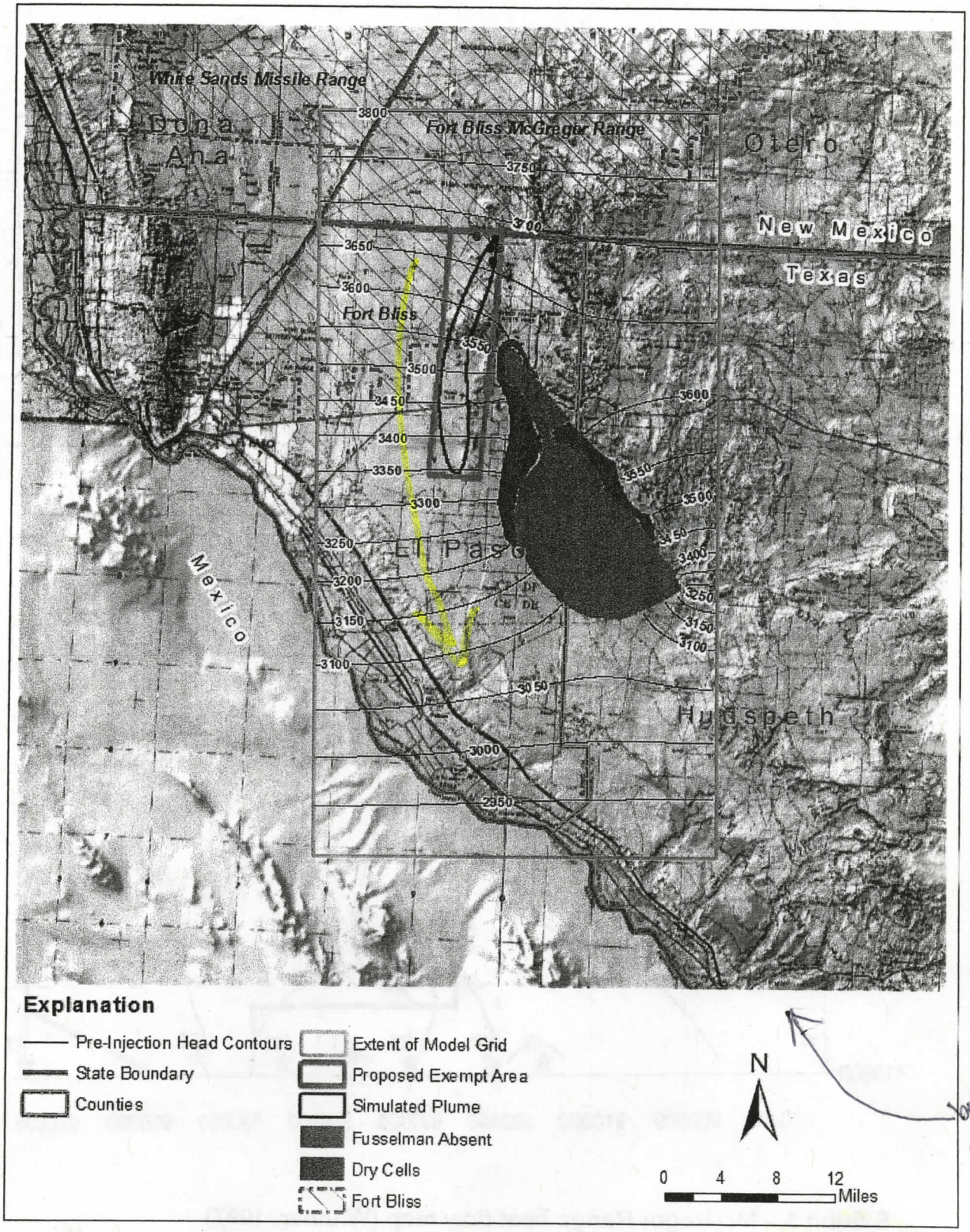


Exhibit 5 – McGregor Range heat flow map (Witcher, 1997)

no markers to judge what we are looking at

not enough explanation to show anything



both sides of the Anticline

Exhibit 6 – Steady-state potentiometric contours

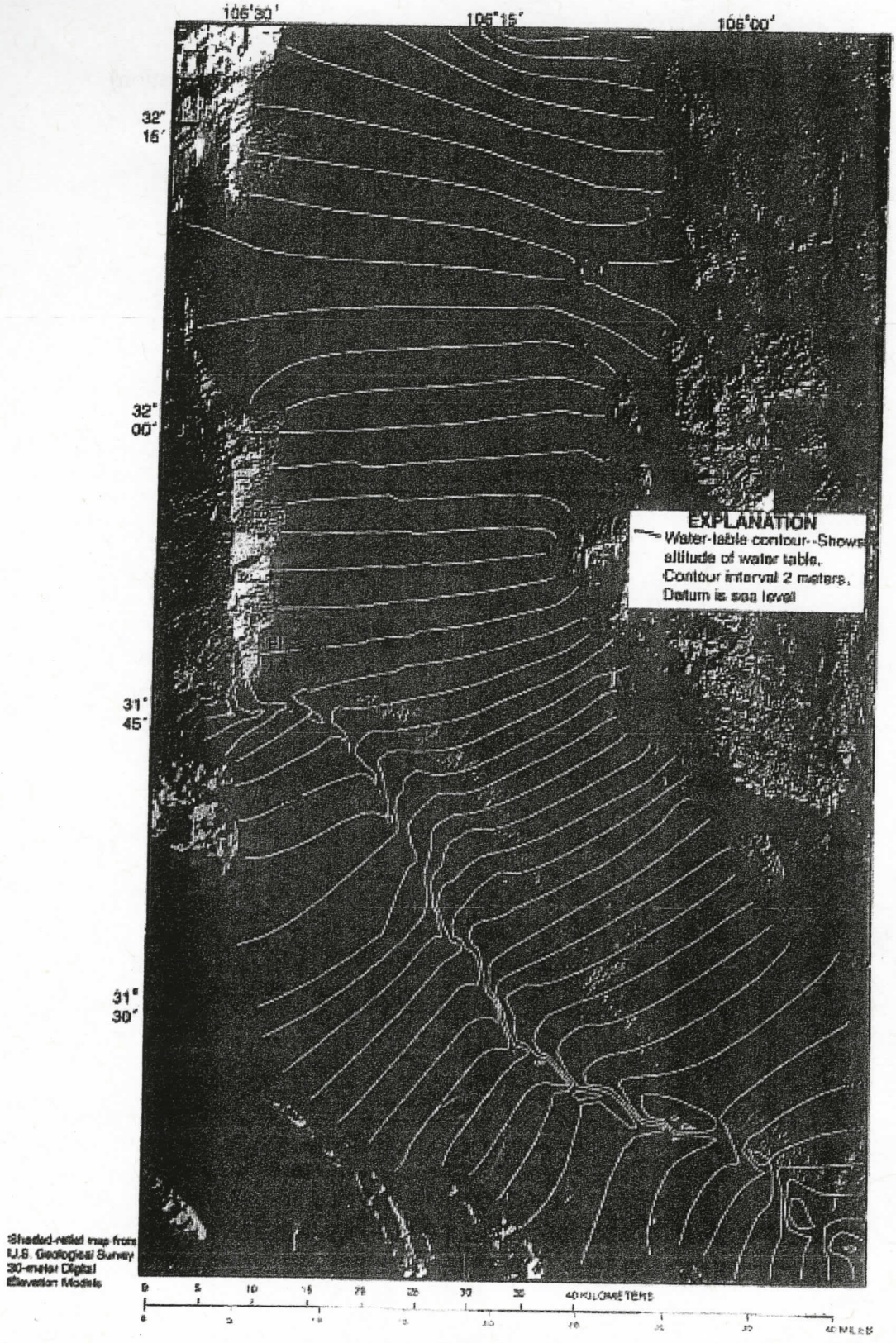


Exhibit 7 – Simulated water table in shallow aquifer (model layers 1 and 2) in 1902 (steady-state conditions)

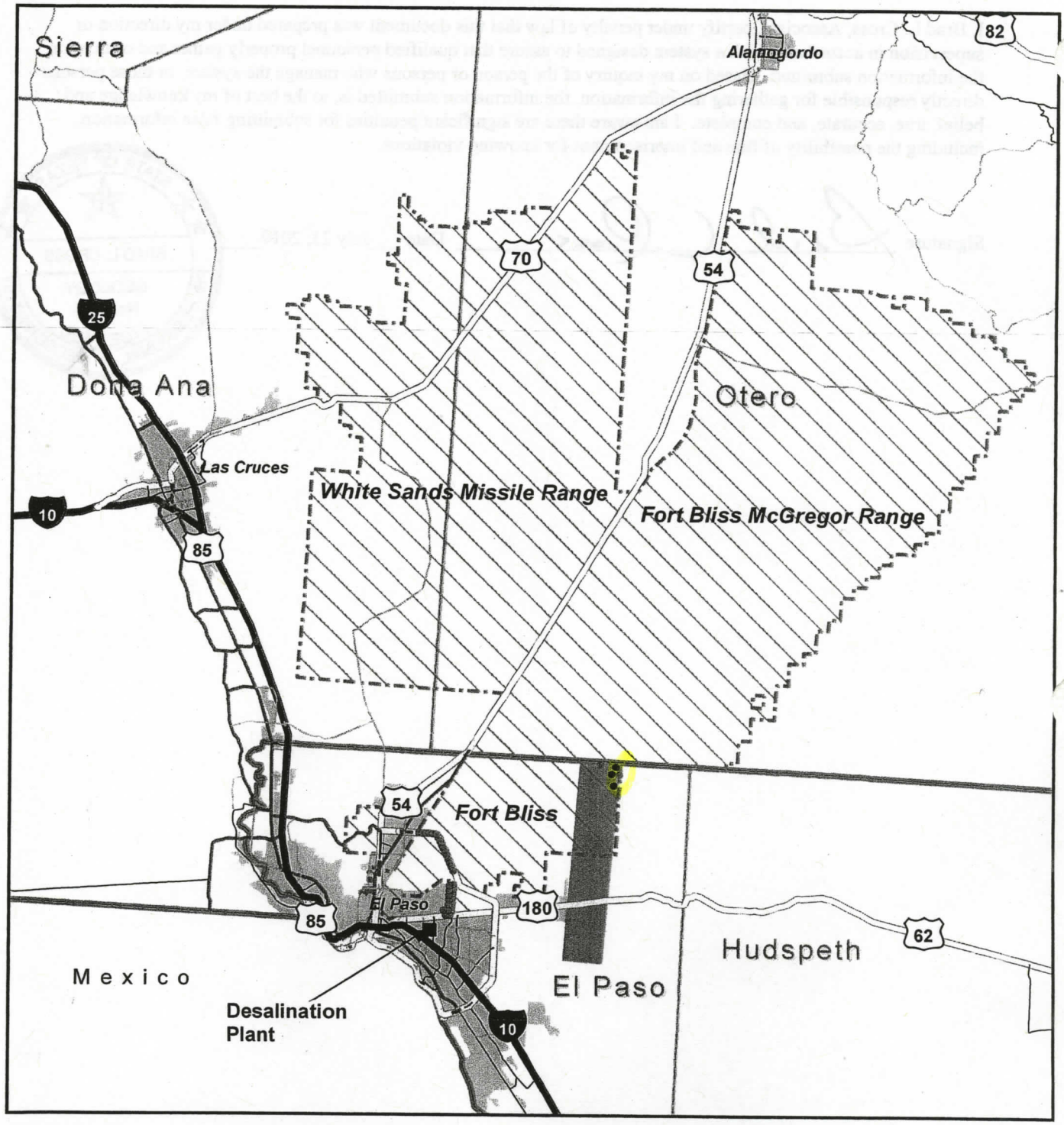
Hueco Tularosa alluvial aquifer piezometric map

ATTACHMENT B

Proposed Exempt Aquifer
(Revised Figure 2 of April 2010 Aquifer Exemption Application)

I, Brad L. Cross, Associate, certify under penalty of law that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluation the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature Brad L Cross Date July 23, 2010



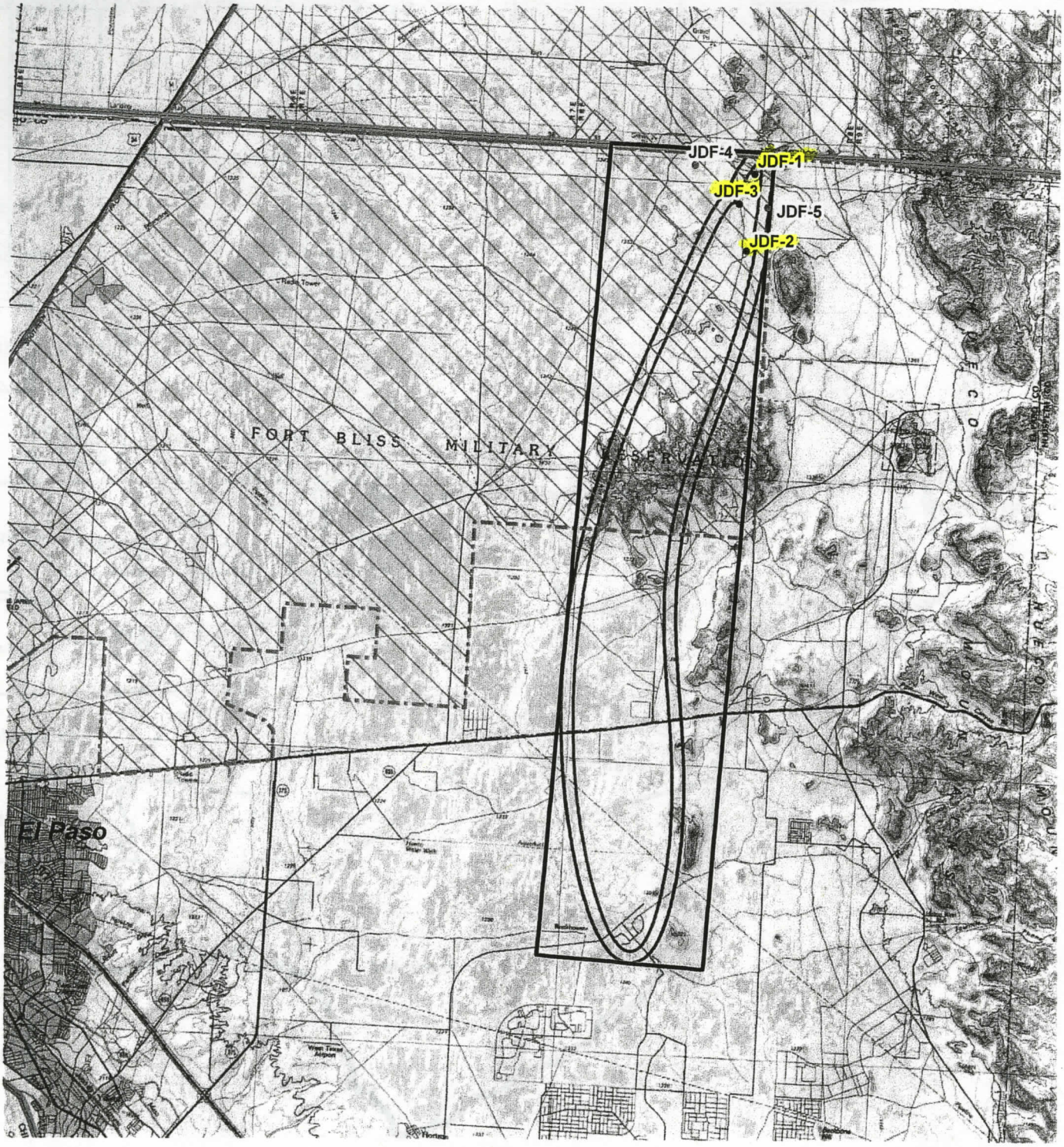
Explanation

- Authorized Injection Wells
- Class V Injection Wells
- Production Wells
- State Boundary
- Fort Bliss
- Urban Areas
- Counties
- Proposed Exempt Area

N

0 5 10 20 Miles

GENERAL LOCATION MAP **FIGURE 1**



Explanation

- Class V Injection Wells
- Authorized Injection Wells

State Boundary

Fort Bliss

Proposed Exempt Area

Concentrate Plume

One-Quarter Mile Buffer Zone

4 #5 permitted - not built

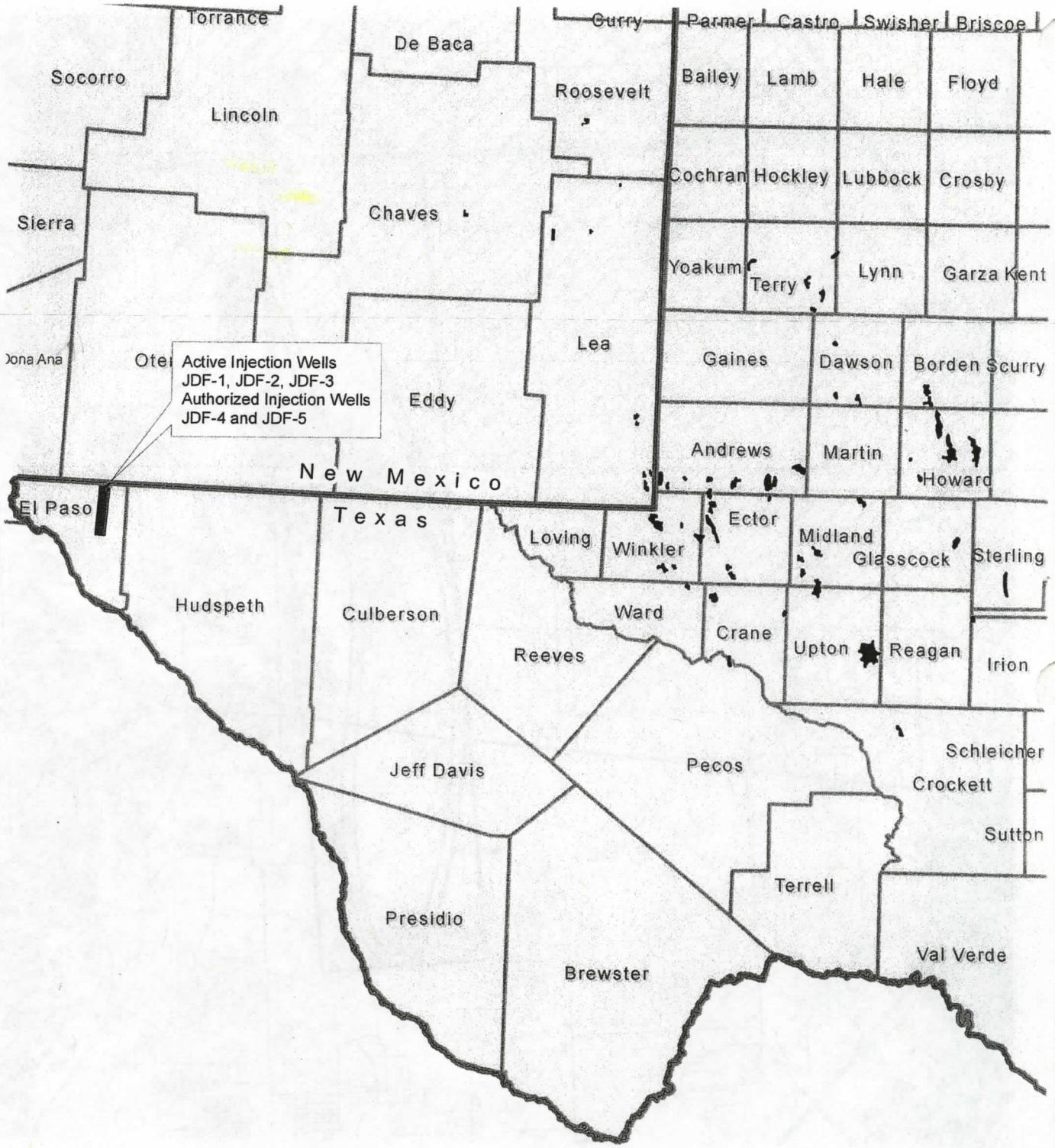
N

0 1.25 2.5 5 Miles

PROPOSED EXEMPT AREA

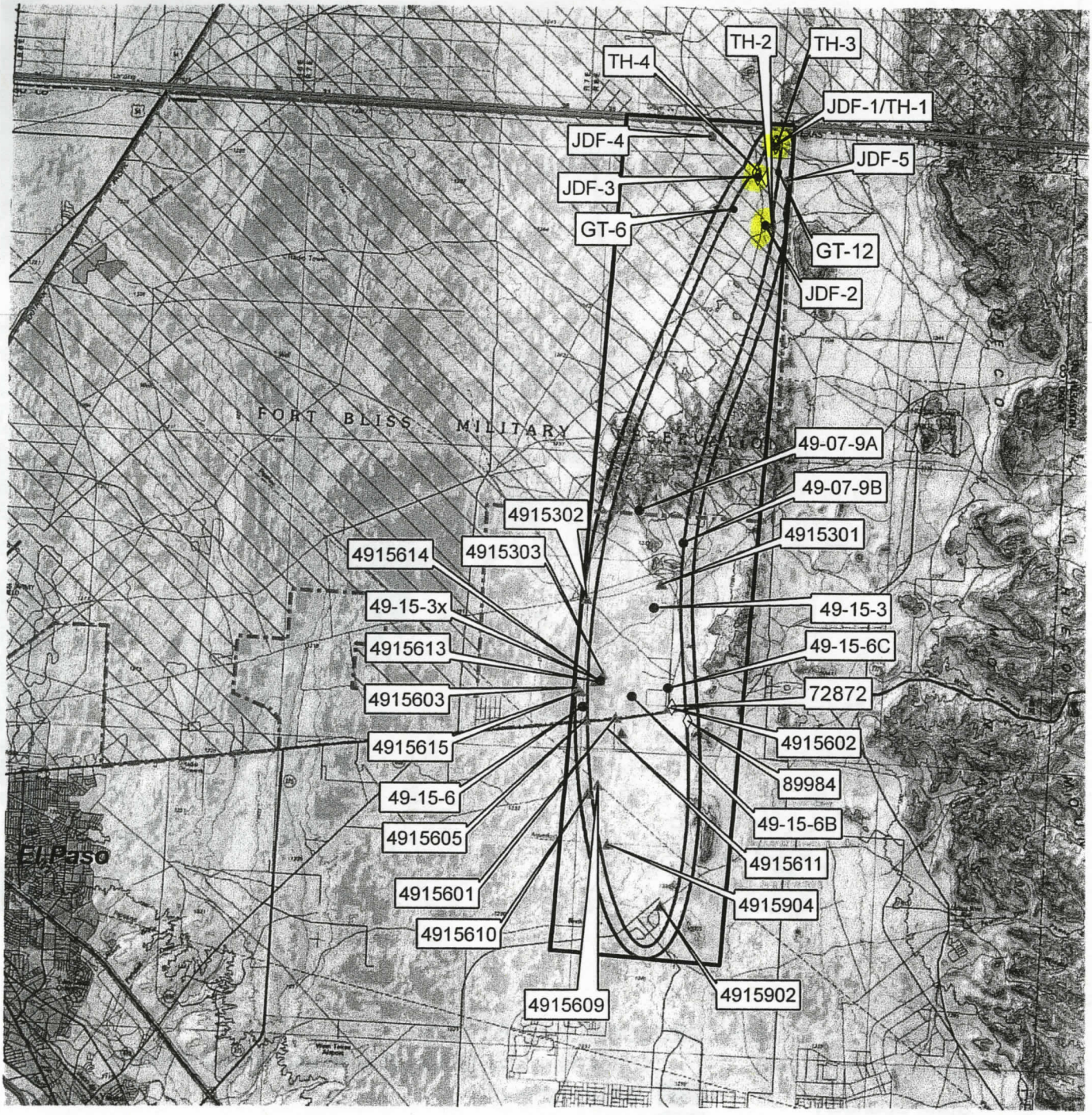
FIGURE 2

LBG



AREAS OF PETROLEUM PRODUCTION IN THE FUSSELMAN

FIGURE 3



Explanation

- Class V Injection Wells
- Authorized Injection Wells
- TWDB Well with State Well Number
- TCEQ Platted wells
- Driller's Log with State Tracking Number
- Temperature Gradient Hole
- Test Holes

- State Boundary
- Fort Bliss
- Proposed Exempt Area
- Concentrate Plume
- One-Quarter Mile Buffer Zone

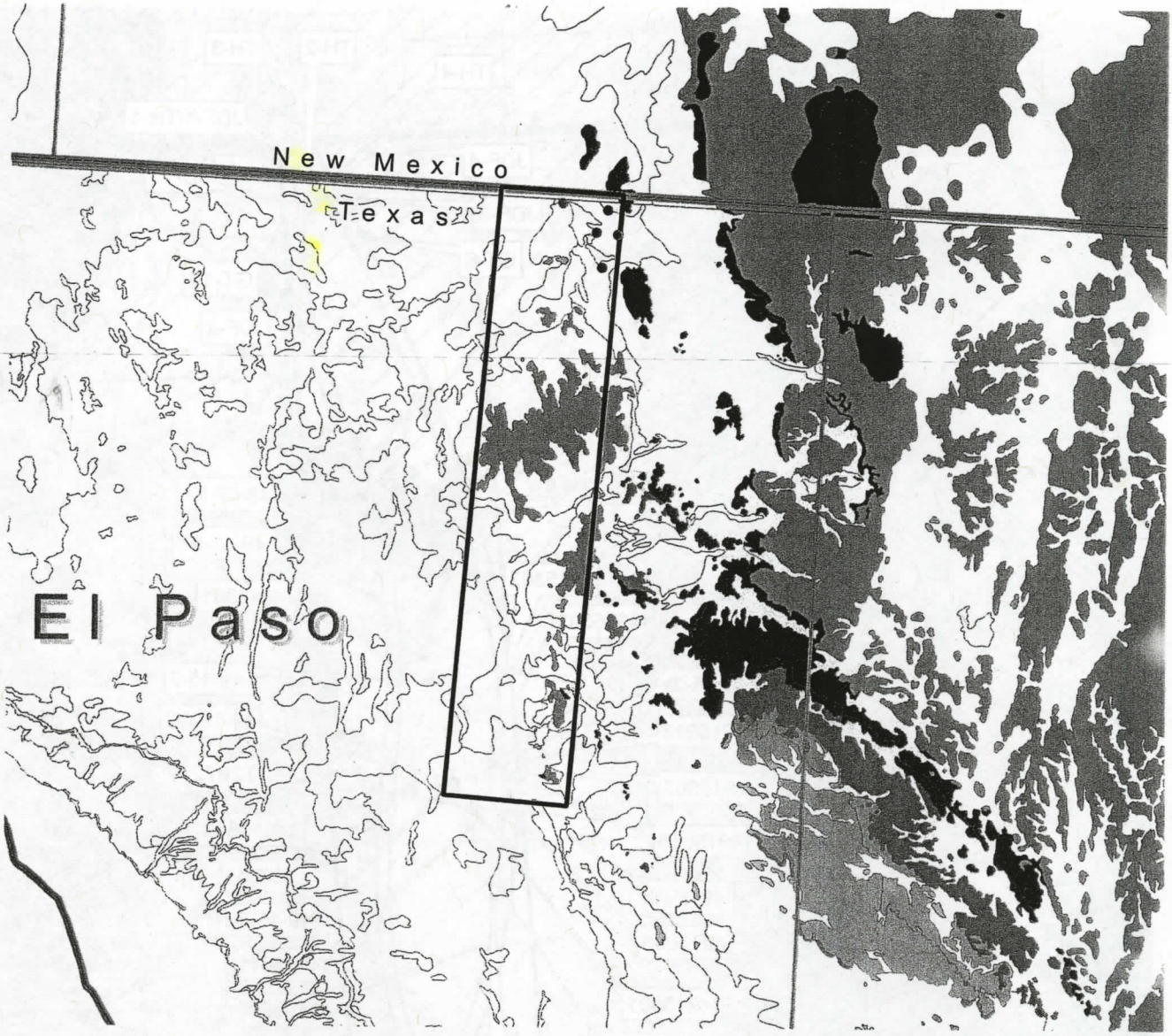
TH-1-4 are test holes
TH-1 became JDF-1

N

0 1.25 2.5 5 Miles

ARTIFICIAL PENETRATIONS IN AREA OF REVIEW **FIGURE 4**

LBG



Explanation

- Authorized Injection Well
- Active Injection Wells
- State Boundary
- Proposed Exempt Area
- County Boundary

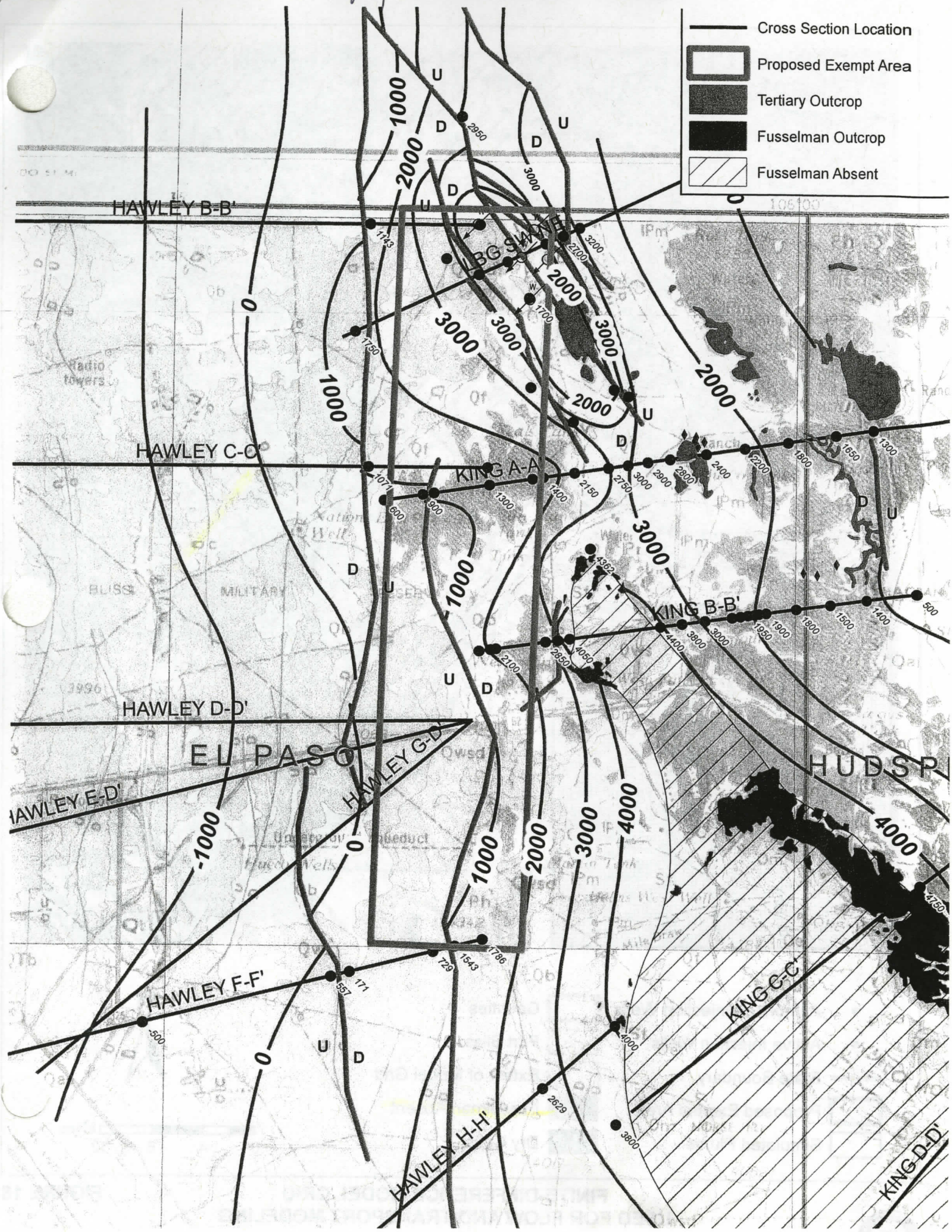
GEOLOGIC UNIT BY AGE

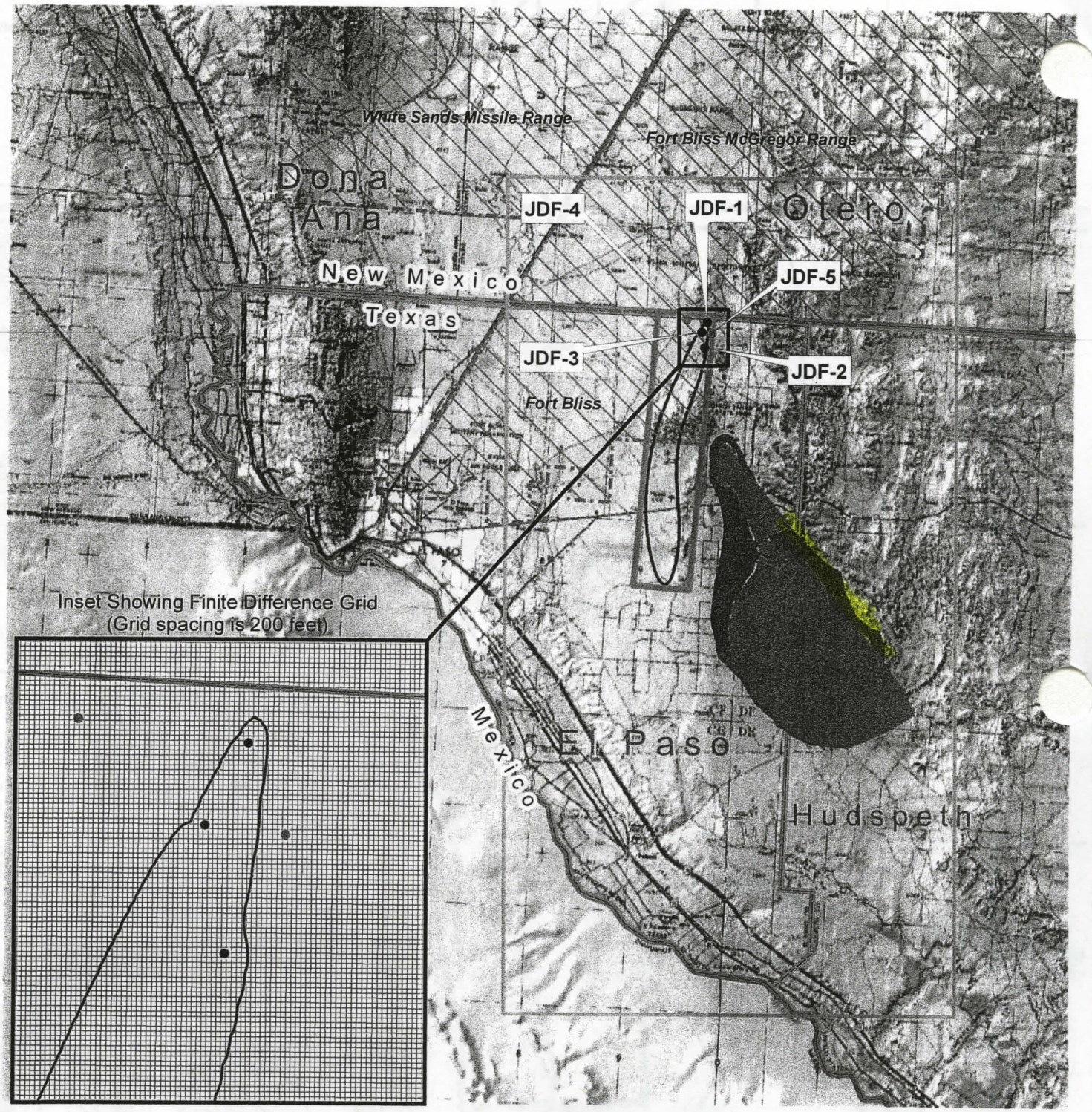
- Quaternary and Tertiary Bolson and Alluvial Deposits
- Tertiary Igneous
- Cretaceous
- Permian
- Pennsylvanian
- Mississippian and Devonian
- Silurian
- Ordovician
- Precambrian

N

0 2.5 5 10 Miles

REGIONAL GEOLOGIC MAP **FIGURE 5**


Top of Fusselman from MSL
Cross Section Location
Proposed Exempt Area
Tertiary Outcrop
Fusselman Outcrop
Fusselman Absent
HAWLEY B-B'
HAWLEY C-C'
KING A-A'
KING B-B'
HAWLEY D-D'
HAWLEY E-D'
HAWLEY G-D'
HAWLEY F-F'
HAWLEY H-H'
KING C-C'
KING D-D'
EL PASO
HUDSP
0
1000
2000
3000
4000
-1000
-500
U
D



FINITE-DIFFERENCE MODEL GRID USED FOR FLOW AND TRANSPORT MODELING

FIGURE 18

LBG

Explanation

- Pre-Injection Head Contours
- State Boundary
- Counties
- Extent of Model Grid
- Proposed Exempt Area
- Simulated Plume
- Fusselman Absent
- Dry Cells
- Fort Bliss

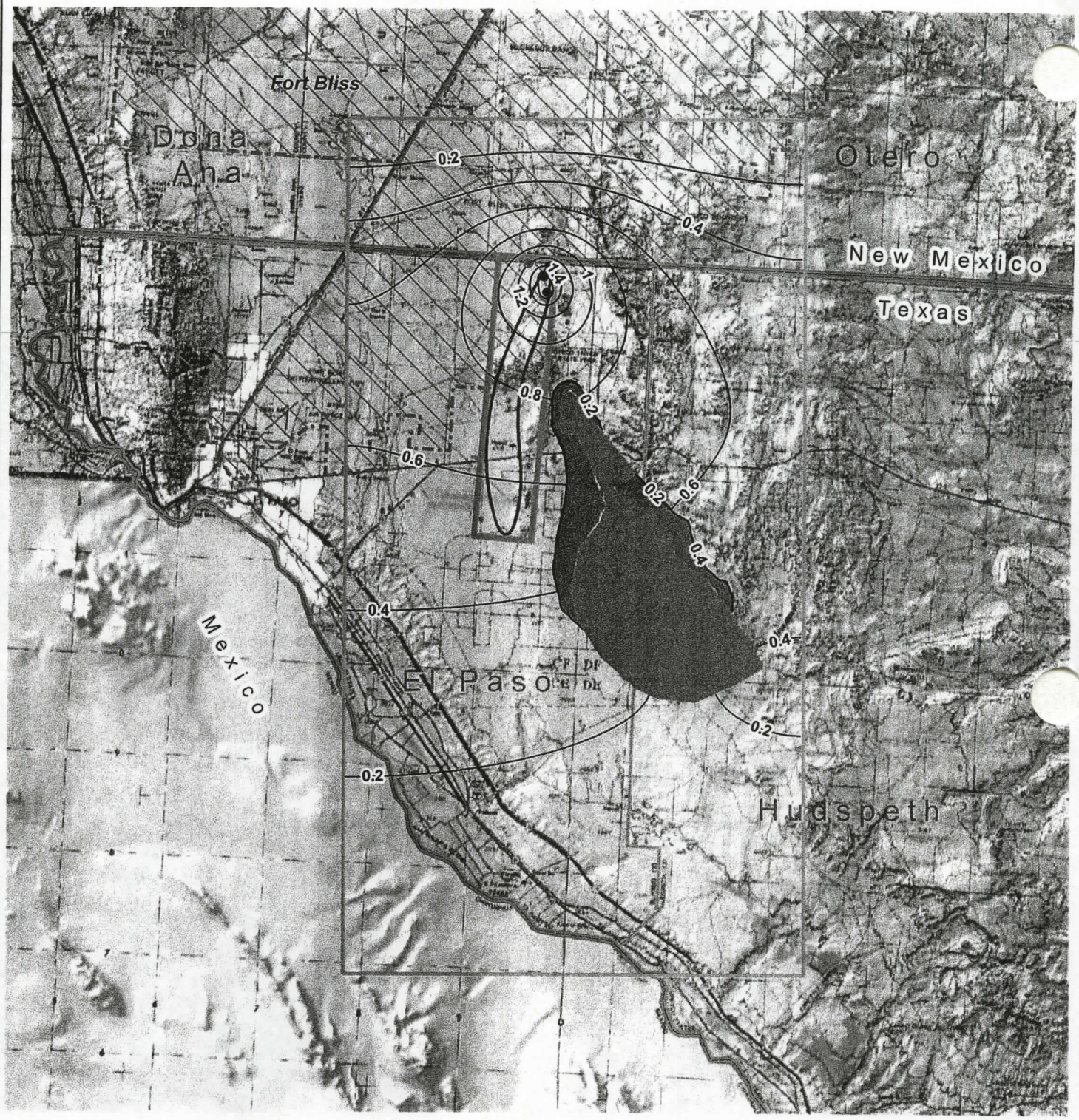
N

0 4 8 12 Miles

STEADY-STATE POTENTIOMETRIC CONTOURS IN THE AQUIFER

FIGURE 19

LBG



Explanation

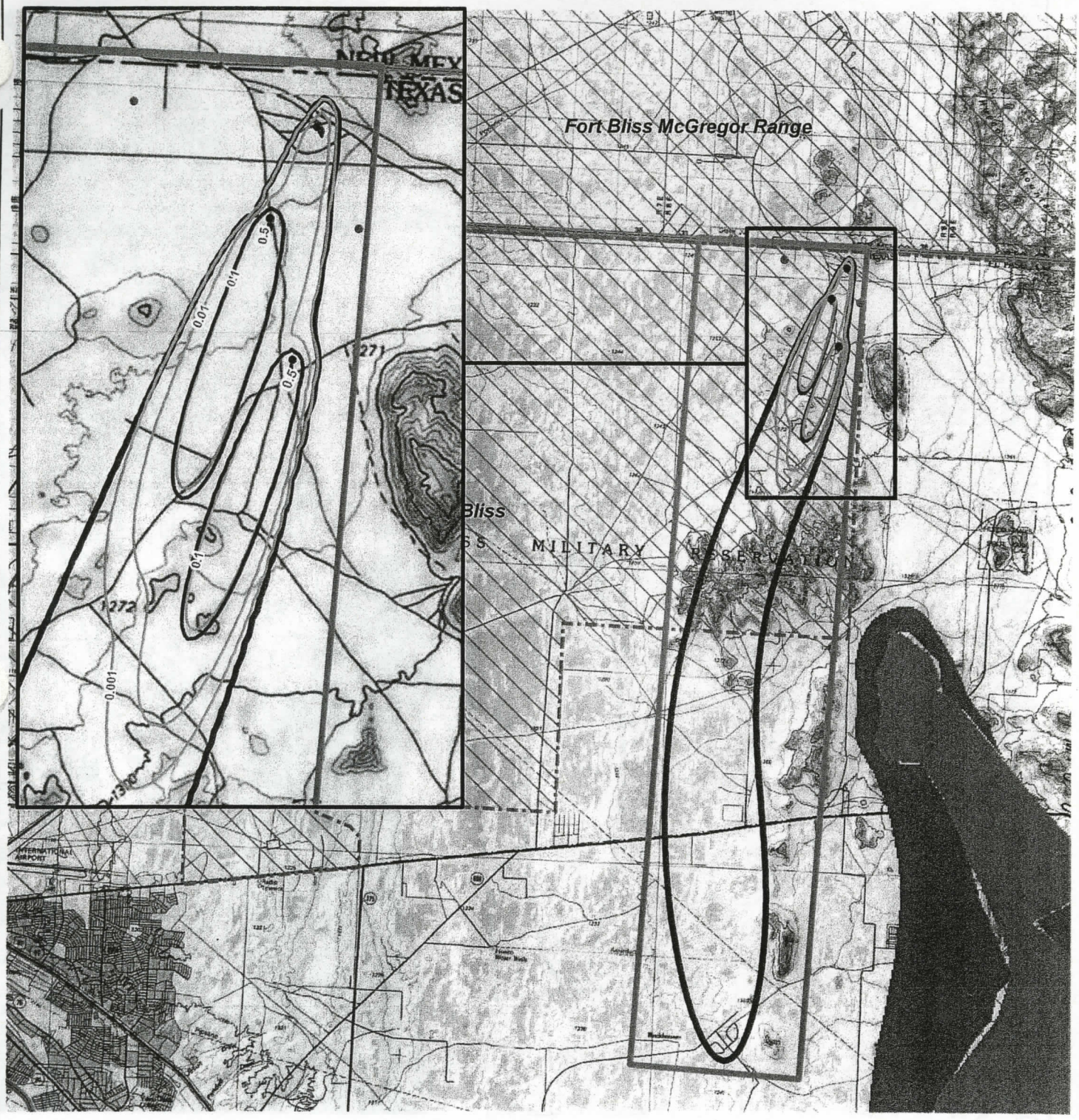
- Active Injection Wells
- Authorized Injection Wells
- Steady-State Injection Head Pressure Increase
- State Boundary
- Fort Bliss
- Counties
- Extent of Model Grid
- Proposed Exempt Area
- Simulated Plume
- Fusselman Absent
- Dry Cells

N

0 4 8 12 Miles

PRESSURE INCREASE (FEET)
AFTER 50 YEARS OF INJECTION

FIGURE 20



Explanation

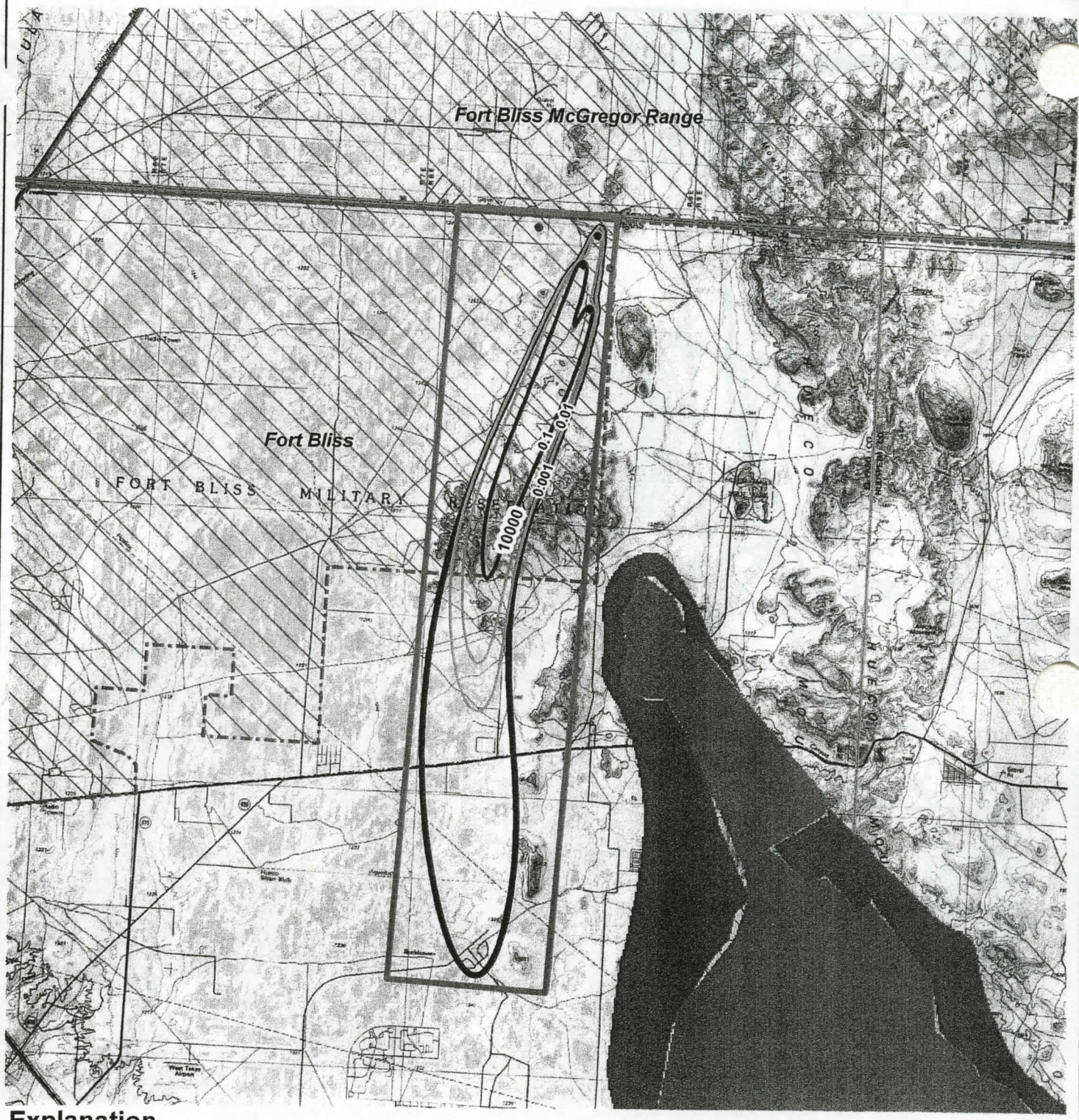
- Authorized Injection Wells
- Active Injection Wells
- State Boundary
- Relative Concentration after 10 yrs of Injection
- Actual Concentration
- Counties
- Proposed Exempt Area
- Fort Bliss
- Simulated Plume
- Fusselman Absent
- Dry Cells

N

0 1 2 3 4 Miles

RELATIVE CONCENTRATION OF INJECTATE AFTER 10 YEARS OF INJECTION

FIGURE 21



Explanation

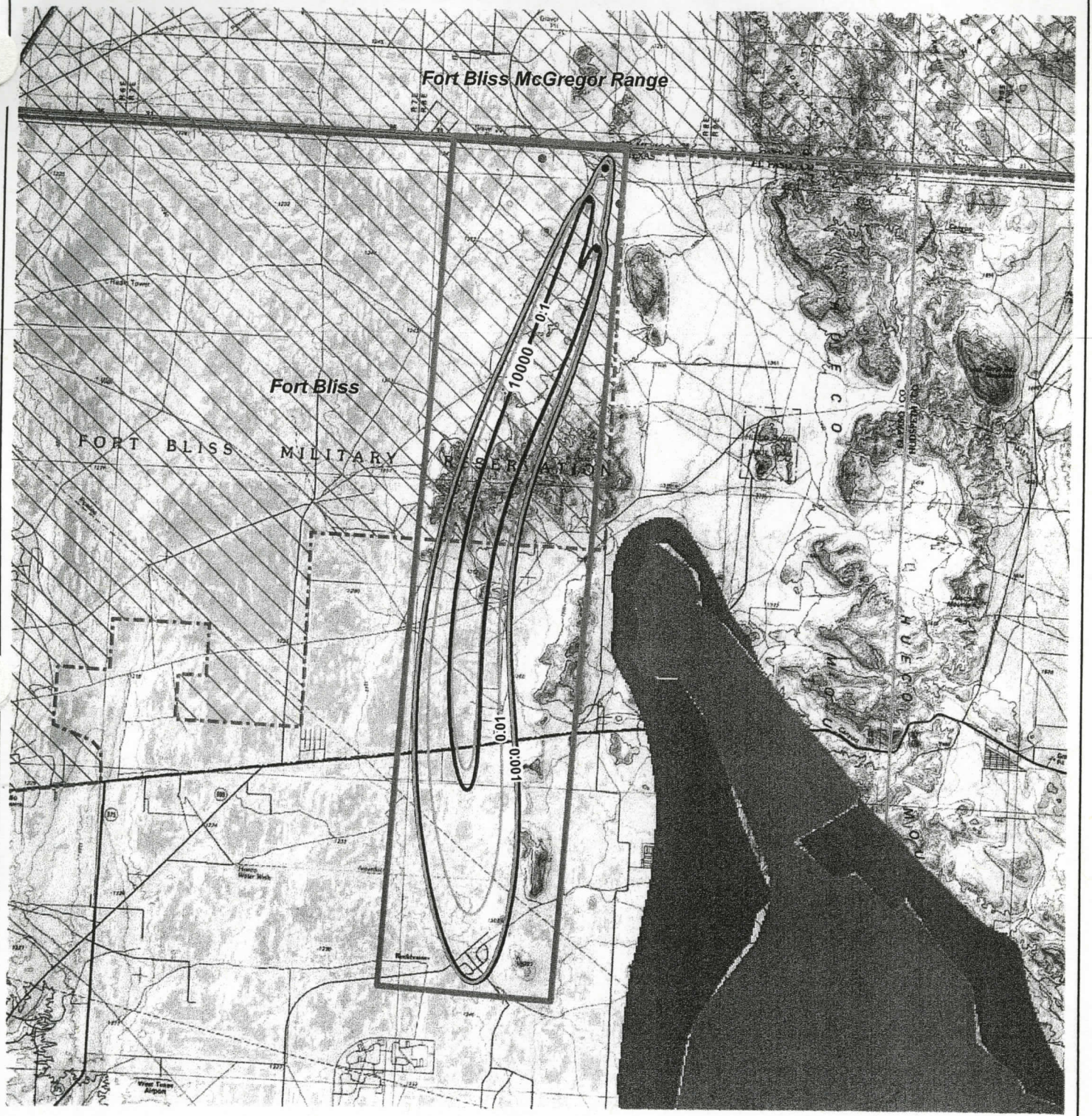
- Authorized Injection Wells
- Active Injection Wells
- Relative Concentration after 30 yrs of Injection
- Actual Concentration
- State Boundary
- Counties
- Proposed Exempt Area
- Simulated Plume
- Fort Bliss
- Fusselman Absent
- Dry Cells

N

0 1 2 3 4 5 Miles

RELATIVE CONCENTRATION OF INJECTATE AFTER 30 YEARS OF INJECTION

FIGURE 22



Explanation

- Authorized Injection Wells
- Active Injection Wells
- Relative Concentration after 50 yrs of Injection
- Actual Concentration
- State Boundary
- Counties
- Proposed Exempt Area
- Simulated Plume
- Fort Bliss
- Fusselman Absent
- Dry Cells

N

0 1 2 3 4 5 Miles

RELATIVE CONCENTRATION OF INJECTATE AFTER 50 YEARS OF INJECTION

FIGURE 23

LBG